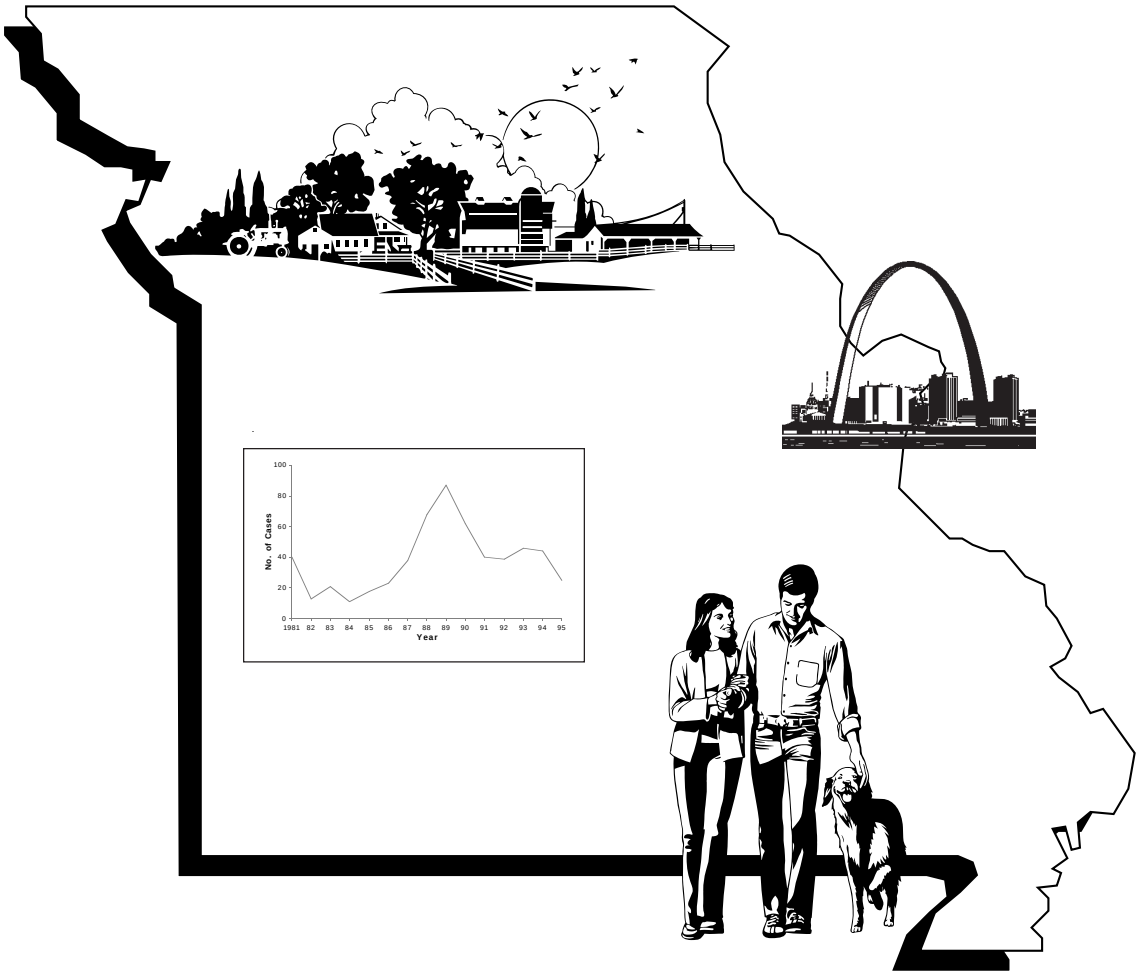
Reportable Diseases and Conditions in Missouri



BIENNIAL REPORT 1994–95

Missouri Department of
HEALTH

Reportable Diseases and Conditions in Missouri

Biennial Report 1994–95

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Missouri Department of Health
Jefferson City, Missouri

Published February 1997

Division of Environmental Health and Communicable Disease Prevention

VISION

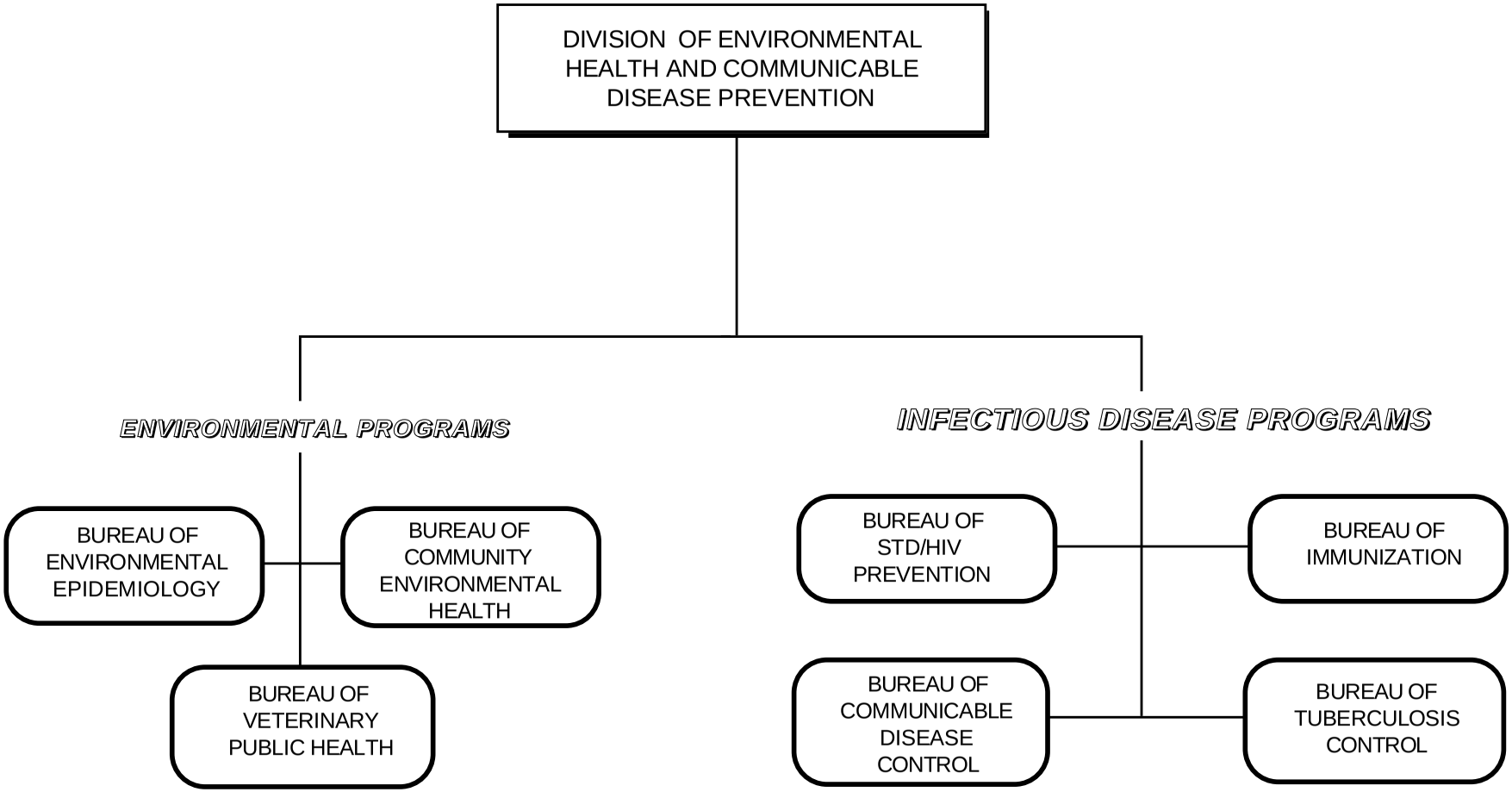
Missouri citizens and communities will enjoy optimal health through reduction of communicable diseases and environmental hazards. As experts in the field, we will continually enhance our level of knowledge and experience in order to assure that our methods, tools and interventions reflect community involvement and remain effective within diverse cultures.

MISSION

The Division of Environmental Health and Communicable Disease Prevention's mission is to protect and promote the public's health by:

- assessing indicators of communicable disease and environmental hazards;
- assuring access to disease prevention, intervention, and environmental assessment services;
- developing policies and regulations;
- educating the public and promoting healthy behaviors; and
- collaborating with public and private entities.

DIVISION OF ENVIRONMENTAL HEALTH AND COMMUNICABLE DISEASE PREVENTION



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Introduction

This is the third biennial report of the disease incidence data received by the Missouri Department of Health, Division of Environmental Health and Communicable Disease Prevention in the 1990s. It contains information about the reportable communicable diseases, including tuberculosis, AIDS and other sexually transmitted diseases. This year we have also included data on reportable environmental and occupational diseases and conditions in Missouri, such as carbon monoxide poisoning, hazardous substance releases and workplace fatalities. Information contained in this report should be useful to health care professionals, public health professionals and policy-makers.

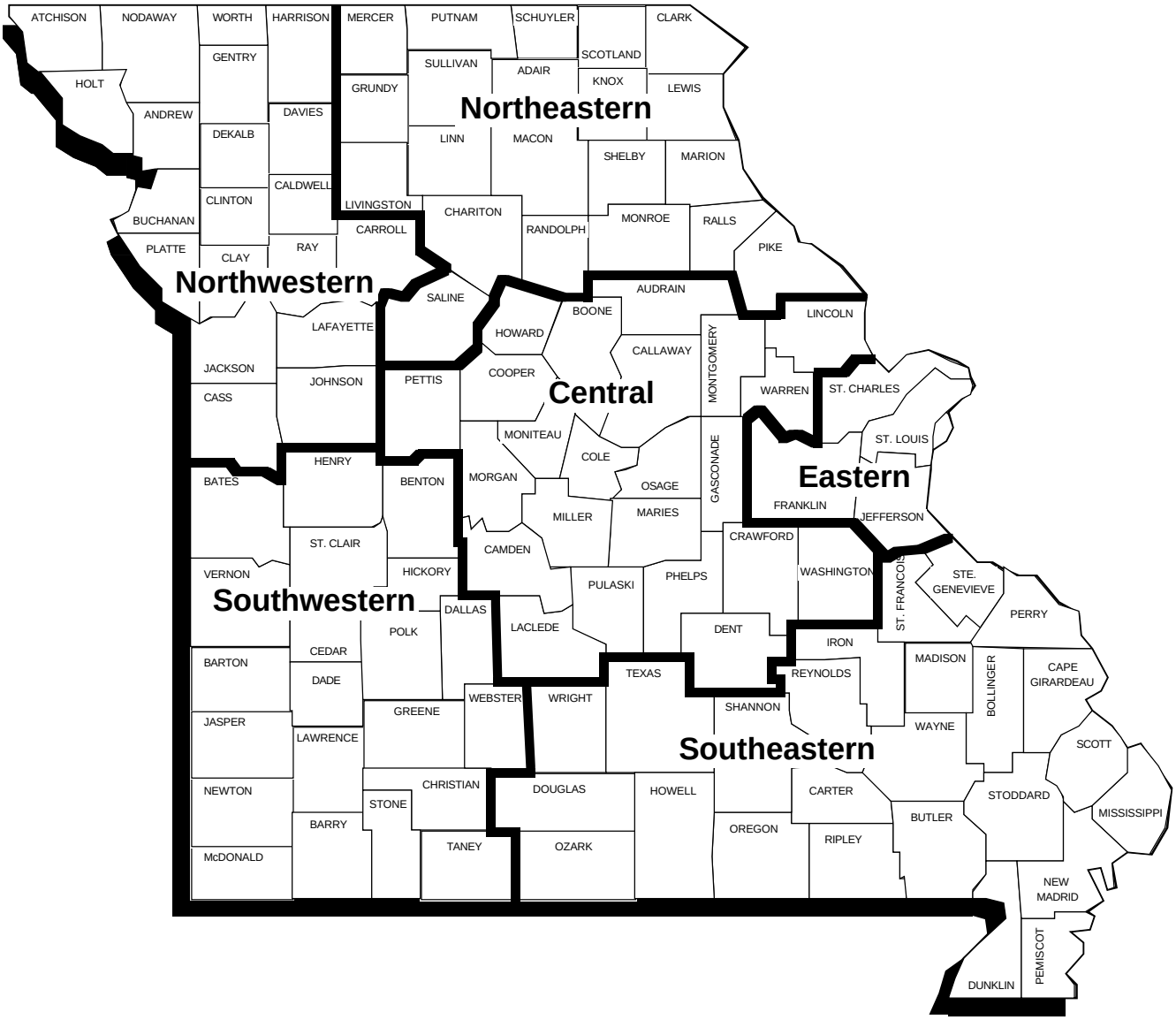
Each of the major diseases and conditions is presented with a brief introduction and summaries of the key statistics and trends, supplemented by tables and graphs. To help put disease trends into perspective, graphs are presented showing disease incidence for the 15-year period 1981–1995 if those data are available.

Reports of diseases of low incidence are provided in table form on page 71. Another table shows the data for diseases reported in large numbers through an active sentinel system that does not identify individuals. In this table, the much smaller numbers of cases reported through the passive surveillance system are included for comparison. Some cases may be reported through both the passive and active systems.

Physicians, physician assistants, nurses, hospitals, clinics and laboratories are required by law to report cases of diseases specified by the Department of Health. Most reports are routed through local and district health departments. Some reports are sent directly to the state agency. Reports are evaluated at all levels of receipt to determine if they meet case definitions and to determine if follow-up or intervention is required.

The reported information is often supplemented by additional data collected by contacting the reporting source. Case reports of certain diseases and conditions are followed by local or Department of Health investigators to assure that patients receive appropriate treatment and that contacts are afforded the benefits of preventive measures and education. Examples of these are tuberculosis, syphilis, HIV/AIDS, hepatitis, meningitis, measles, childhood lead poisoning and workplace fatalities. Reports of single cases or small numbers of unusual diseases may lead to discovery and investigation of outbreaks, which in turn may stimulate specific recommendations for control measures to interrupt transmission. Reports may identify groups at high risk, leading to targeted intervention efforts with those groups. Data also help in health planning, policy making and research.

Department of Health Districts



Central District Health Office
1001-A Southwest Boulevard
Jefferson City, MO 65101
(573) 751-4216

Eastern District Health Office
220 South Jefferson
St. Louis, MO 63130
(314) 877-2800

Northeastern District Health Office
708 Patton Street, P.O. Box 309
Macon, MO 63552
(816) 385-3125

Northwestern District Health Office
13901 Noland Court
Independence, MO 64055
(816) 325-6100

Southeastern District Health Office
2875 James Boulevard
Poplar Bluff, MO 63901
(573) 840-9727

Southwestern District Health Office
P.O. Box 777, MPO
1414 West Elfindale
Springfield, MO 65801
(417) 895-6900

Department of Health Reporting Rules

19 CSR 20-20.020 Reporting Communicable, Environmental and Occupational Diseases

PURPOSE: *This rule designates the diseases, disabilities, conditions and findings that must be reported to the local health authority or the Department of Health. It also establishes when they must be reported.*

Editor's Note: The following material is incorporated into this rule by reference:

1) 56 ***Federal Register*** *52166–52175, October 17, 1991 (Washington: U.S. Government Printing Office, 1991).*

In accordance with section 536.031(4), RSMo, the full text of material incorporated by reference will be made available to any interested person at the Office of the Secretary of State and the headquarters of the adopting state agency.

(1) Category I diseases or findings shall be reported to the local health authority or to the Department of Health within twenty-four (24) hours of first knowledge or suspicion by telephone, facsimile or other rapid communication. Category I diseases or findings are–

- Acute chemical poisoning as defined in 56 FR 52166–52175
- Anthrax
- Botulism
- Brucellosis
- Cholera
- Diphtheria
- Group A Streptococcal disease, invasive
- Haemophilus influenzae disease, invasive, including meningitis
- Hantavirus
- Hemolytic Uremic Syndrome, post-diarrheal
- Hepatitis A
- Hyperthermia
- Hypothermia
- Measles
- Meningococcal disease, invasive, including meningitis
- Methemoglobinemia
- Outbreaks or epidemics of any illness, disease or condition that may be of public health concern
- Pesticide poisoning
- Plague
- Poliomyelitis
- Psittacosis
- Rabies
- Rubella
- Syphilis
- Tuberculosis disease
- Typhoid fever

(2) Category II diseases or findings shall be reported to the local health authority or the Department of Health within three (3) days of first knowledge or suspicion. Category II diseases or findings are–

- Acquired immunodeficiency syndrome (AIDS)
- Arsenic poisoning
- Cadmium poisoning
- Campylobacter infections
- Carbon monoxide poisoning
- Chancroid
- Chlamydia trachomatis infections
- Cryptosporidiosis
- *E. coli* O157:H7
- Ehrlichiosis
- Encephalitis, arthropod-borne
- Giardiasis
- Gonorrhea
- Hepatitis B, acute
- Hepatitis B Surface Antigen (prenatal HBsAg) positive screening of pregnant women
- Hepatitis non-A, non-B
- Human immunodeficiency virus (HIV) infection, confirmed
- Influenza
- Kawasaki disease
- Lead exposure greater than or equal to ten micrograms per deciliter (≥10 μg/dl) in persons under age eighteen (<18) or greater than or equal to twenty-five micrograms per deciliter (≥25 μg/dl) in persons age eighteen or greater (≥18)
- Legionellosis
- Leptospirosis
- Listeria monocytogenes
- Lyme disease
- Malaria
- Meningitis, aseptic
- Mercury poisoning
- Mumps
- Mycobacterial disease other than tuberculosis (MOTT)
- Nosocomial outbreaks
- Occupational lung diseases including silicosis, asbestosis, byssinosis, farmer's lung and toxic organic dust syndrome
- Pertussis
- Respiratory diseases triggered by environmental factors including environmentally or occupationally induced asthma and bronchitis
- Reye syndrome
- Rocky Mountain spotted fever
- Salmonella infections
- Shigella infections
- Tetanus

T-Helper (CD4+) lymphocyte count on any person with HIV infection
Toxic shock syndrome
Trichinosis
Tuberculosis infection
Tularemia
Yersinia enterocolitica

(3) The occurrence of any outbreak or epidemic of any illness or disease which may be of public health concern, including any illness in a food handler that is potentially transmissible through food, shall be reported to the local health authority or the Department of Health by telephone, facsimile, or other rapid communication within twenty-four (24) hours of first knowledge or suspicion.

(4) A physician, physician's assistant, nurse, hospital, clinic, or other private or public institution providing care to any person who is suffering from any disease, condition or finding listed in sections (1)–(3) of this rule, or who is suspected of having any of those diseases, conditions or findings shall make a case report to the local health authority or the Department of Health or cause a case report to be made by their designee within the specified time.

(A) A physician, physician's assistant, or nurse providing care to any patient, with any disease, condition or finding listed in sections (1)–(3) of this rule, in an institution may authorize, in writing, the administrator or designee of the institution to submit case reports on patients attended by the physician, physician's assistant, or nurse at the institution. But under no other circumstances shall the physician, physician's assistant, or nurse be relieved of this reporting responsibility.

(B) Duplicate reporting of the same case by health care providers in the same institution is not required.

(5) A case report as required in section (4) of this rule shall include the patient's name, address, age, sex, race, phone number, name of the disease, condition or finding diagnosed or suspected, the date of onset of the illness, name and address of the treating facility (if any) and the attending physician, any appropriate laboratory results, name and address of the reporter, and the date of report.

(A) A report of an outbreak or epidemic as required in section (3) of this rule shall include the diagnosis or principal symptoms, the approximate number of cases, the local health authority jurisdiction within which the cases occurred, the identity of any cases known to the reporter, and the name and address of the reporter.

(6) Any person in charge of a public or private school, summer camp or day care facility shall report to the local health authority or the Department of Health the presence or suspected presence of any diseases or findings listed in sections (1)–(3) of this rule according to the specified time frames.

(7) All local health authorities shall forward to the Department of Health reports of all diseases or findings listed in sections (1)–(3) of this rule. All reports shall be forwarded within twenty-four (24) hours after being received, according to procedures established by the Department of Health director. The local health authority shall retain from the original report any information necessary to carry out the required duties in 19 CSR 20-20.040(2) and (3).

(8) Information from patient medical records received by the Department of Health is to be considered confidential records and not public records.

(9) Reporters specified in section (4) of this rule will not be held liable for reports made in good faith in compliance with this rule.

(10) This rule will expire on June 30, 2000.

Auth: sections 192.006, RSMo (Cum. Supp. 1995) and 192.020, 201.040 and 210.050, RSMo (1994). This rule was previously filed as 13 CSR 50-101.020. Original rule filed July 15, 1948, effective Sept. 13, 1948. For intervening history, please consult the* ***Code of State Regulations****. Amended: Filed Sept. 15, 1995, effective April 30, 1996.*

**Original authority: 192.006, RSMo (1993), amended 1995; 192.020, RSMo (1939), amended 1945, 1951; 210.040, RSMo (1941), amended 1993; and 210.050, RSMo (1941), amended 1993.*

19 CSR 20-20.080 Duties of Laboratories

PURPOSE: *This rule establishes the responsibility of laboratories to report to the Missouri Department of Health the results of all positive tests for specified diseases.*

(1) The director or person in charge of any laboratory shall report to the local health authority or the Missouri Department of Health the result of any test that is positive for, or suggestive of, any disease listed in 19 CSR 20-20.020. These reports shall be made according to the time and manner specified for each disease or condition following completion of the test and shall designate the test performed, the results of test, the name and address of the attending physician, the name of the disease or condition diagnosed or suspected, the date the test results were obtained, the name of the patient and the patient's age, sex and race.

(2) In reporting findings for diseases listed in 19 CSR 20-20.020, laboratories shall report–

- Blood or serum chemical/pesticide level greater than the Lowest Quantifiable Limit;
- Blood lead level greater than or equal to ten micrograms per deciliter (≥10 µg/dl) in persons under age eighteen (<18) or greater than or equal to twenty-five micrograms per deciliter (≥25 µg/dl) in persons age eighteen or greater (≥18);
- Blood mercury level greater than or equal to three-tenths micrograms per deciliter (≥0.3 µg/dl);
- Carboxyhemoglobin level greater than fifteen percent (15%);
- Urinary arsenic level greater than or equal to one hundred micrograms per liter (≥100 µg/l);
- Urinary cadmium level greater than or equal to one microgram per liter (≥1.0 µg/l); and
- Urinary mercury level greater than or equal to twenty micrograms per liter (≥20 µg/l).

(3) This rule will expire on June 30, 2000.

Auth: sections 192.006, RSMo (Cum. Supp. 1995) and 192.020, RSMo (1994). This rule was previously filed as 13 CSR 50-101.090. Original rule filed July 15, 1948, effective Sept. 13, 1948. Amended: Filed Aug. 4, 1986, effective Oct. 11, 1986. Amended: Filed Aug. 14, 1992, effective April 8, 1993. Amended: Filed Sept. 15, 1995, effective April 30, 1996.*

**Original authority: 192.006, RSMo (1993), amended 1995 and 192.020, RSMo (1939) amended 1945, 1951.*

Missouri Morbidity and Mortality Reports of Selected Communicable Diseases - 15 Year Report

	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981
AIDS	769	727	1,644	657	651	596	478	401	240	91	52	28	6	1	-
Amebiasis	18	38	54	23	25	26	19	30	27	26	28	44	45	11	28
Brucellosis	0	0	0	0	3	1	2	4	14	4	12	7	4	4	4
Campylobacter	601	631	616	614	602	547	473	441	260	281	304	260	166	115	78
Chickenpox	8,840	10,147	9,609	10,009	7,678	10,591	9,086	11,350	8,595	5,093	2,474	2,565	408	637	880
Chlamydia	12,084	12,244	11,625	11,907	10,643	11,151	8,151	6,239	2,944	1,532	412	9	-	-	-
Encephalitis, Inf.	11	14	26	16	22	12	6	8	11	13	12	11	28	16	10
Giardiasis	761	774	770	739	790	878	859	654	690	516	458	462	216	235	113
Gonorrhea	11,302	12,555	13,147	14,887	17,450	20,012	21,053	17,241	16,491	19,029	20,023	20,042	20,750	21,269	22,249
Haemophilus influenzae type b															
Meningitis	10	7	12	22	42	88	106	138	131	172	108	104	86	66	-
Other Invasive	18	44	123	59	39	57	-	-	-	-	-	-	-	-	-
Hepatitis A	1,338	619	1,443	1,500	653	619	810	897	560	126	98	138	123	204	282
Hepatitis B	437	538	585	535	549	633	704	639	460	420	359	297	365	297	307
Non A, Non B	23	32	25	27	31	42	53	50	46	39	42	18	33	24	-
Unspecified	1	1	19	9	15	19	13	21	21	15	24	46	87	95	214
Influenza (confirmed)	491	163	272	111	462	220	293	148	69	78	61	39	140	153	225
Lyme Disease	53	102	108	150	207	205	108	-	-	-	-	-	-	-	-
Malaria	9	14	9	12	9	13	13	6	8	12	5	8	4	10	4
Meningitis, Asep.	269	175	275	272	277	246	223	124	163	172	156	95	277	156	178
Meningitis, Mening.	54	43	34	32	37	31	21	33	35	40	46	53	55	40	45
Mumps	25	44	46	39	40	62	87	68	38	23	18	11	21	13	40
Pertussis	63	45	144	120	83	116	141	25	46	32	35	23	24	17	24
Polio, all forms	0	0	0	0	0	0	0	1	0	0	1	0	2	0	1
Rabies, Animal	30	27	35	37	28	30	62	36	59	75	59	70	96	123	243
RMSF	30	22	20	24	25	36	48	54	26	25	10	14	14	10	23
Rubella	0	2	1	1	5	3	4	0	0	1	7	0	0	38	2
Rubeola	2	161	1	0	1	103	671	65	190	32	5	6	1	2	1
Salmonellosis	577	642	529	426	616	723	676	772	660	728	690	617	602	571	700
Shigellosis	1,138	654	674	742	259	284	411	607	471	89	143	244	264	67	268
Syphilis, Total	1,271	1,985	2,499	1,940	926	598	388	473	328	494	578	712	801	1,069	1,397
Primary & Secondary	584	987	1,354	1,167	572	272	162	154	90	110	133	186	145	296	394
Tetanus	3	1	1	1	1	0	4	1	1	2	3	6	1	1	1
Tuberculosis	244	260	256	245	254	312	278	275	339	338	311	354	399	390	432
Tularemia	25	24	17	34	44	33	39	45	58	32	35	40	51	27	28
Typhoid Fever	3	1	2	3	2	4	2	3	7	6	6	6	10	4	9
Yersinia enterocolitica	21	40	26	37	48	32	36	30	10	6	2	3	1	-	-

Diseases of the Gastrointestinal Tract

Campylobacteriosis *(Campylobacter enteritis)*

Campylobacteriosis is an acute enteric disease of bacterial origin. The disease is characterized by bloody and mucoid diarrhea, abdominal cramps, fever, nausea and vomiting. The primary mode of transmission for this disease is through consumption of inadequately cooked foods of animal origin, including poultry, beef, pork and unpasteurized milk. This disease can also be acquired by individuals such as veterinarians, farmers and food processing workers, who are exposed to animals and animal products.

In Missouri, there were 631 cases of campylobacteriosis in 1994 and 601 cases in 1995. The number of cases had increased annually since 1987, but has leveled off in the last four years. See Figure 1.

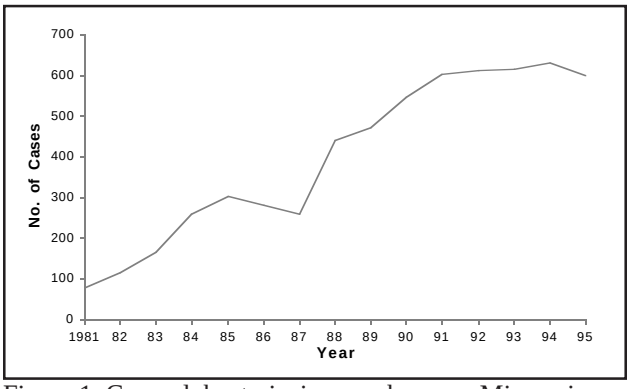


Figure 1. Campylobacteriosis cases by year, Missouri, 1981–95

The highest reported incidence occurred in those less than 5 years of age, with incidence rates of 26.5 per 100,000 in 1994 and 27.6 per 100,000 in 1995. See Figure 2.

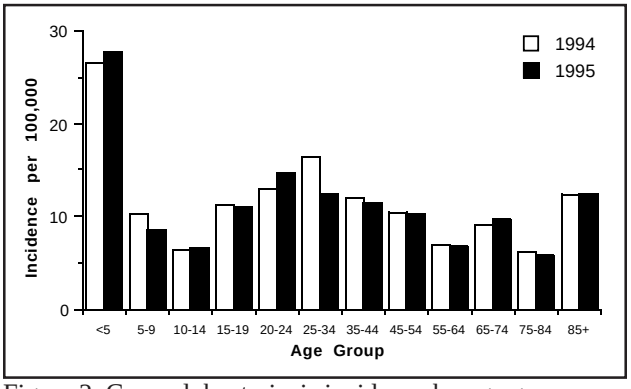


Figure 2. Campylobacteriosis incidence by age group, Missouri, 1994–95

The geographic distribution of campylobacteriosis by Department of Health districts is shown in Figure 3. The Eastern health district had the highest incidence in 1994 at a rate of 15.1 per 100,000. The Southwestern health district had the highest incidence in 1995 at a rate of 16.0 per 100,000.

Figure 4 shows the incidence rates by county in 1995.

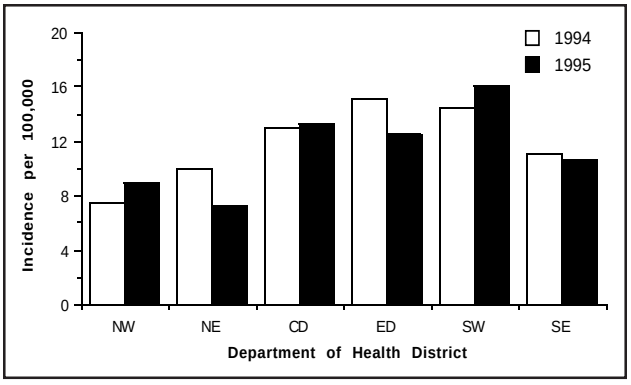


Figure 3. Campylobacteriosis incidence by health district, Missouri, 1994–95

Among the cases reported for 1994 and 1995, 209 (17.0%) were hospitalized and two deaths were reported for a case fatality rate of 1.6 per 1,000.

Despite the high number of cases reported in children under 5 years of age and a substantial number of cases in children in the 5-9 age group, less than 1.8 percent of cases were reported to be in child care.

Like many other enteric diseases, the primary mode of transmission for campylobacter is food, but the causes of many diarrheal illnesses are underreported. The physician is the first point of contact in tracking and controlling possible foodborne illness, but physicians only notified the health department of 10.6 percent of the reported cases of campylobacterosis. In 1995, 29.6 percent of all cases were reported by hospitals and 21.3 percent by commercial laboratories.

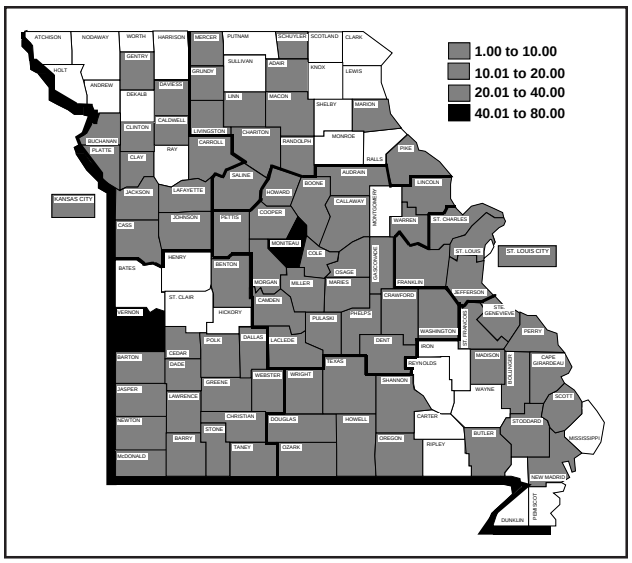


Figure 4. Campylobacteriosis incidence per 100,000 by county, Missouri, 1995

Escherichia coli O157:H7

Since its identification as a cause of human illness in 1982, *Escherichia coli* O157:H7 has emerged as an important cause of diarrheal illness in the United States. It is also the most common cause of hemolytic uremic syndrome (HUS), an illness characterized by acute renal failure, anemia and low platelet count. The typical symptoms of *E. coli* O157:H7 infection are abdominal cramps and bloody diarrhea, with little or no fever. Some patients have nonbloody diarrhea; in others, the bleeding is profuse.

Cattle can be colonized with *E. coli* O157:H7. Transmission occurs by ingestion of contaminated food, most often inadequately cooked beef; directly from person to person in families, child care centers and custodial institutions; and through contaminated drinking or recreational water. Serious outbreaks have occurred in the United States from inadequately cooked hamburgers. Other vehicles of transmission identified in outbreaks include unpasteurized milk, apple cider made from apples contaminated by cow manure, contaminated unchlorinated municipal water, and various foods cross-contaminated by raw beef.

E. coli has been a reportable disease in Missouri since mid-1992. Forty cases were reported in 1994, and 48 were reported in 1995. The highest reported incidence occurred in those less than 5 years of age, with incidence rates of 3.5 per 100,000 in 1994 and 3.3 per 100,000 in 1995. See Figure 1.

The Southeastern health district had the highest incidence in 1994, with a rate of 1.6 per 100,000. The Southwestern health district had the highest incidence in 1995, with a rate of 1.5 per 100,000. See Figure 2.

Among the reported cases for 1994 and 1995, 35 (39.8%) were hospitalized; one death occurred, for a case fatality rate of 11.4 per 1,000. Figure 3 shows the incidence rates by county in 1995.

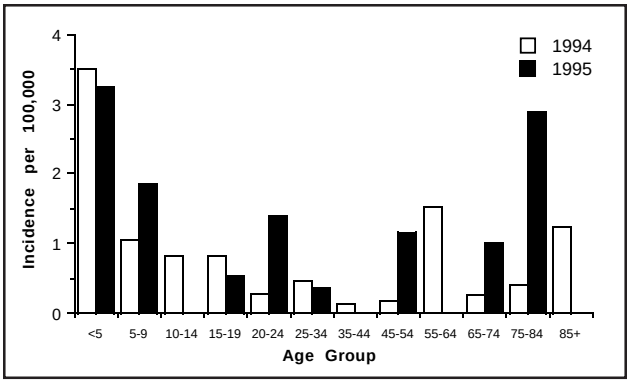


Figure 1. *E. coli* O157:H7 incidence by age group, Missouri, 1994–95

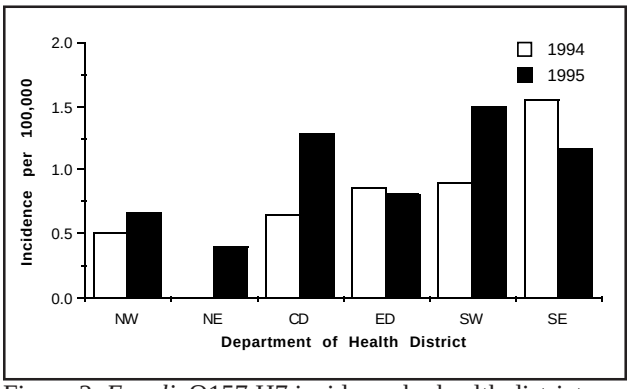


Figure 2. *E. coli* O157:H7 incidence by health district, Missouri, 1994–95

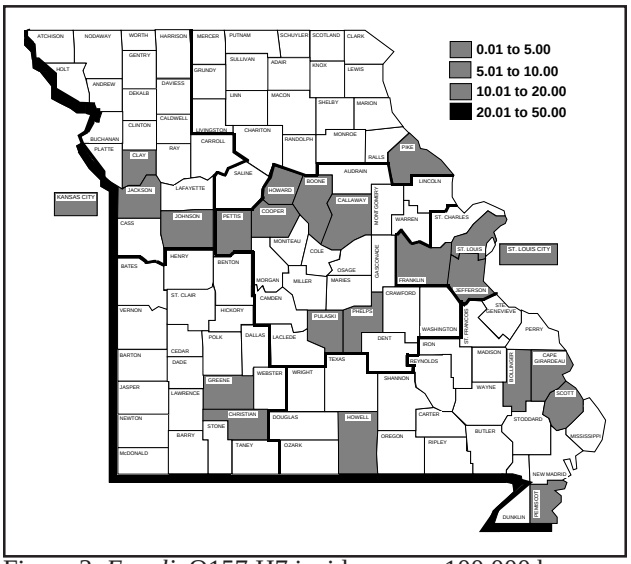


Figure 3. *E. coli* O157:H7 incidence per 100,000 by county, Missouri, 1995

Giardiasis (*Giardia enteritis*)

Giardiasis is usually a mild intestinal disease caused by a protozoan flagellate, *Giardia lamblia.* This protozoan infects the upper small intestine and usually does not produce symptoms. It is sometimes associated with symptoms such as chronic diarrhea, abdominal cramps, bloating, steatorrhea, fatigue and weight loss. The parasite can be passed from person to person by the fecal-oral route or through contaminated food and water.

In Missouri, there were 774 cases of giardiasis reported in 1994 and 761 cases in 1995. The number of cases reported annually increased relatively steadily from the time giardiasis became reportable in 1979 until 1990, and declined in years 1991 and 1992, rising slightly in 1993 and remaining essentially stable for 1994 and 1995. See Figure 1.

This disease continues to affect primarily those less than 5 years of age with incidence rates of 63.91 per 100,000 in 1994 and 53.62 per 100,000 in 1995. See Figure 2. In 1994, 7.4 percent were reported to be in child care, and 6.2 percent in 1995.

The geographic distribution of giardiasis by Department of Health districts in Missouri is shown in Figure 3. Figure 4 shows the incidence rates by county in 1995.

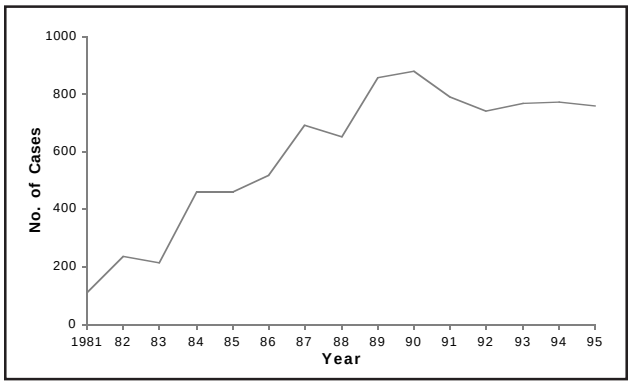


Figure 1. Giardiasis cases by year, Missouri, 1981–95

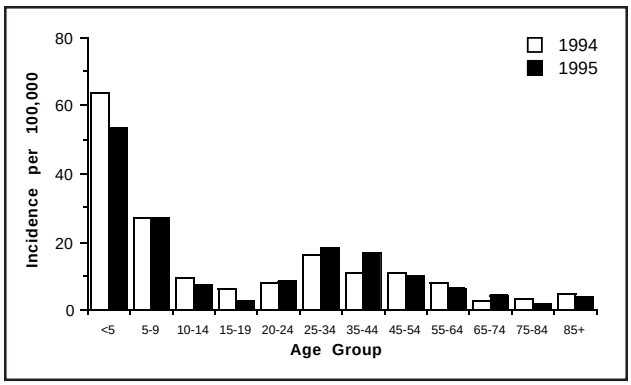


Figure 2. Giardiasis incidence by age group, Missouri, 1994–95

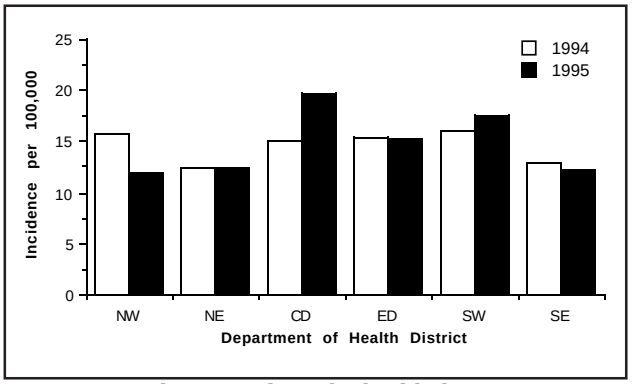


Figure 3. Giardiasis incidence by health district, Missouri, 1994–95

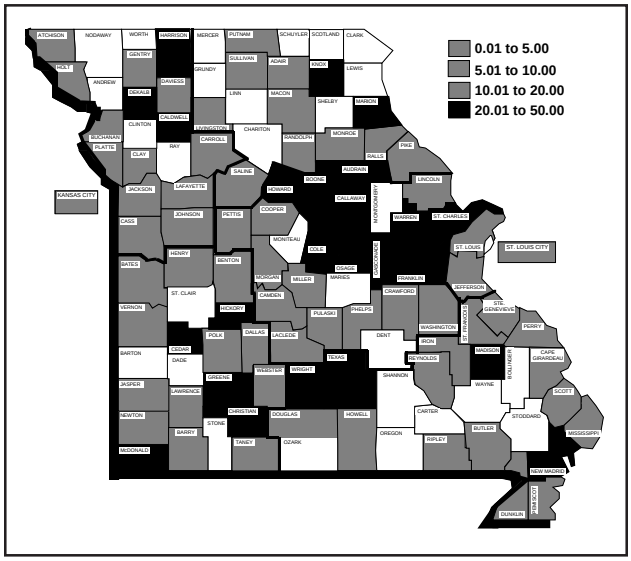


Figure 4. Giardiasis incidence per 100,000 by county, Missouri, 1995

Salmonellosis

Salmonellosis is a bacterial infection that can be caused by a variety of *Salmonella* organisms. The genus *Salmonellae* includes over 2,000 serotypes. Each serotype has its own antigenic composition and usual host range. Salmonellosis manifests with the following symptoms: acute enterocolitis, abdominal pain, diarrhea, vomiting, nausea and anorexia. Symptoms may be mild and infections may occur without symptoms. Deaths associated with salmonellosis are uncommon, but the morbidity and the associated costs of this disease are high. There is regional variation in the prevalence of the different serotypes; *S. enteritidis* and *S. typhimurium* are the two most commonly reported serotypes in the United States and Missouri.

Transmission of *Salmonella* organisms occurs through infected food animals or fecal contamination of food. Common sources include poultry, meat and meat products, raw and undercooked eggs and egg products, raw milk and raw milk products, as well as pet turtles and chicks and unsterilized pharmaceuticals of animal origin.

In Missouri, there were 642 cases of salmonellosis reported in 1994 and 577 cases in 1995. See Figure 1.

Children less than 5 years of age had the highest reported rate of *Salmonella* infection, with incidence rates of 41.4 per 100,000 in 1994 and 45.2 per 100,000 in 1995. See Figure 2. In 1995, 2.6 percent were reported to be in chid care.

The Central health district had the highest incidence in 1994 with a rate of 21.3 per 100,000. The Southeastern health district had the highest incidence in 1995 with a rate of 14.9 per 100,000. See Figure 3.

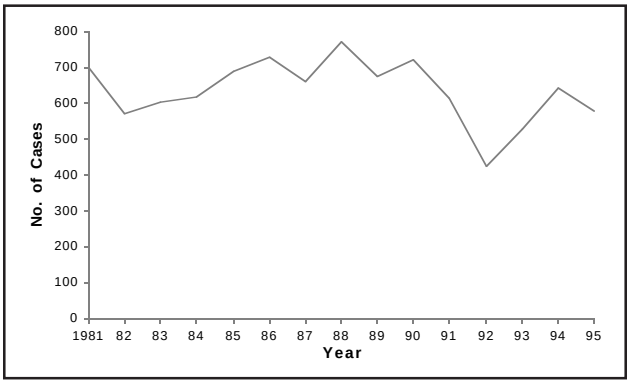


Figure 1. Salmonellosis cases by year, Missouri, 1981–95

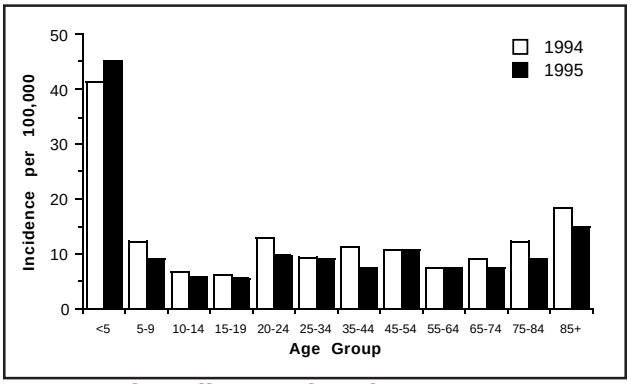


Figure 2. Salmonellosis incidence by age group, Missouri, 1994–95

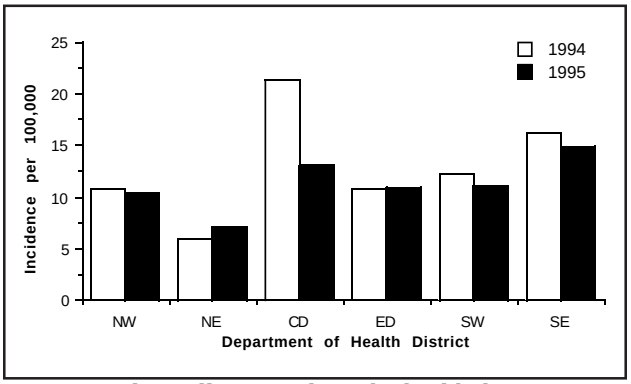


Figure 3. Salmonellosis incidence by health district, Missouri, 1994–95

Figure 4 shows the incidence rates by county in 1995.

The most common serotypes isolated in Missouri in 1994-95 are shown in Figure 5.

Among the reported cases in 1994 and 1995, 325 (26.7%) were hospitalized and there were four deaths for a case fatality rate of 3.3 per 1,000.

The physician is the first point of contact in tracking and controlling possible foodborne illness, but physicians only notified the health department of 9.7 percent of the reported cases of salmonellosis. In 1995, the largest number (32.6%) were reported by commercial laboratories.

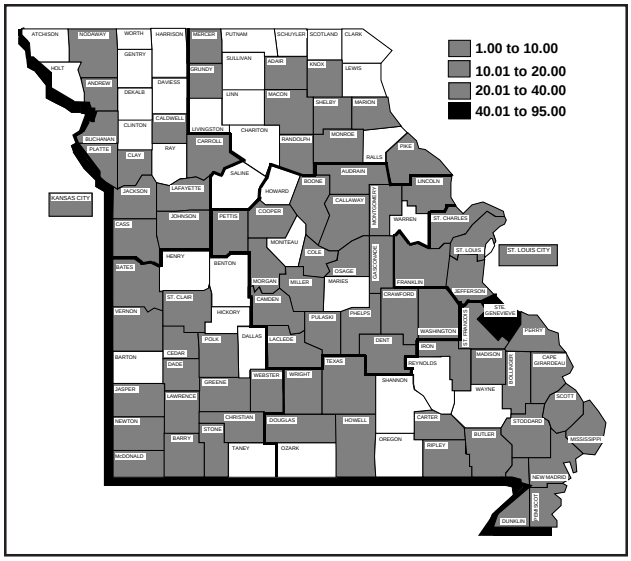


Figure 4. Salmonellosis incidence per 100,000 by county, Missouri, 1995

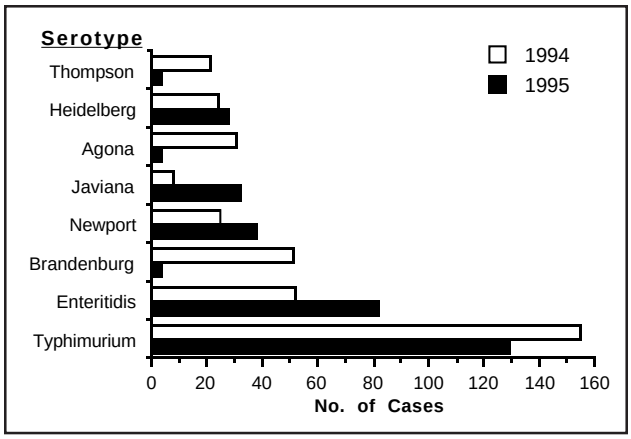


Figure 5. Leading *Salmonella* serotypes in Missouri, 1994–95

Shigellosis (Bacillary dysentery)

Shigellosis is a bacterial enteric disease transmitted among humans. The disease causes diarrhea (which may contain blood and mucous), fever, vomiting, nausea and abdominal cramps. There may be mild and even asymptomatic cases. The usual means of transmission is by direct or indirect fecal-oral contamination from an infected person. A major factor in transmission is poor hygienic practices such as failure to wash hands and clean under the fingernails following defecation. The disease is more severe in children, elderly adults and debilitated individuals.

The number of cases of shigellosis in Missouri reached the highest level in the past 15 years in 1995 with 1,138 cases. This is a 74 percent increase over the 654 cases reported in 1994. See Figure 1.

The highest reported incidence occurred in those less than 5 years of age, with incidence rates of 56.3 per 100,000 in 1994 and 87.8 per 100,000 in 1995. See Figure 2. In 1994, 26 percent were reported to be in child care, and that number decreased to 14 percent in 1995.

The Northeastern health district had the highest incidence in 1994 with an incidence rate of 25.5 per 100,000. The Northwestern health district had the highest incidence in 1995 with an incidence rate of 39.8 per 100,000. See Figure 3.

Among the reported cases for 1994 and 1995, 167 (9.4%) were hospitalized; no deaths occurred.

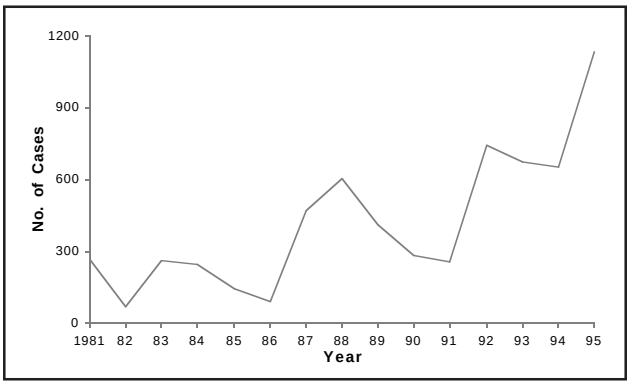


Figure 1. Shigellosis cases by year, Missouri, 1981-95

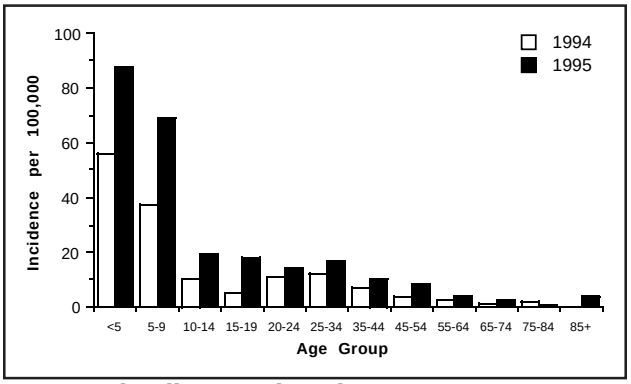


Figure 2. Shigellosis incidence by age group, Missouri, 1994–95

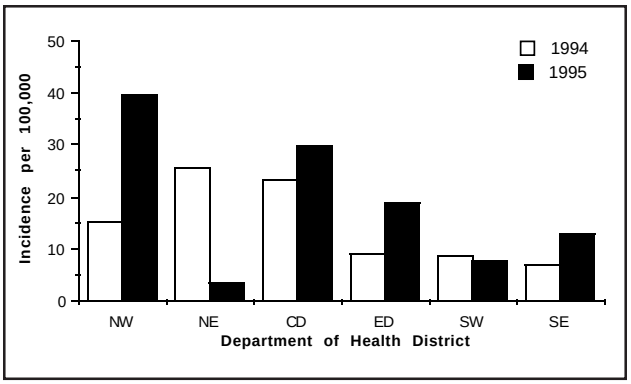


Figure 3. Shigellosis incidence by health district, Missouri, 1994–95

Figure 4 shows the incidence rates by county in 1995.

There are four species of *Shigella* with many serotypes. Table 1 shows the number of isolates identified in Missouri by species.

Table 1. *Shigella* species in Missouri, 1994–95

Species	1994	1995
S. sonnei	484 (74.0%)	872 (76.6%)
S. flexneri	13 (2.0%)	8 (0.7%)
S. boydii	2 (0.3%)	2 (0.2%)
Unspecified	155 (23.7%)	256 (22.5%)

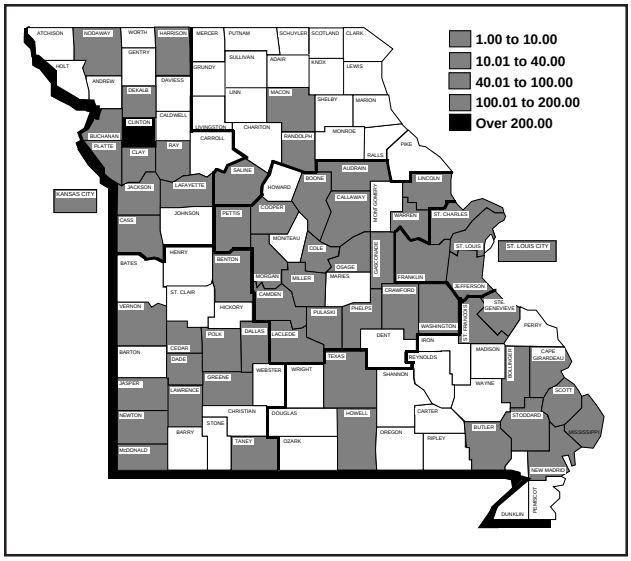


Figure 4. Shigellosis incidence per 100,000 by county, Missouri, 1995

Yersiniosis (*Yersinia enterocolitica*)

Yersiniosis is an acute bacterial enteric disease with the following signs and symptoms: acute watery diarrhea (especially in young children), enterocolitis, fever and vomiting. Less common symptoms include erythema nodosum, cutaneous ulcerations, osteomyelitis and septicemia. The *Yersinia* genus includes *Y. pestis*, the agent of plague, and numerous others, most of which are not pathogenic.

Yersinia enterocolitica is reportable in Missouri and presents most commonly with a gastroenterocolitis syndrome. There are over 50 serotypes and five biotypes of *Y. enterocolitica*, many of which are non-pathogenic.

The pig is the principal reservoir of pathogenic *Y. enterocolitica*. Fecal-oral transmission occurs when contaminated food and drinks are consumed or contact occurs with an infected person or animal. Although *Y. enterocolitica* has been isolated from a variety of foods, the pathogenic strains are most commonly isolated from raw pork products. It is able to grow and multiply in refrigerated and microaerophilic conditions, so there is an increased risk of infection if uncured meat is stored undercooked.

In Missouri, the number of reported cases of yersiniosis fluctuated during the past two years, increasing to 40 cases reported in 1994 and decreasing to 21 cases in 1995. See Figure 1.

The highest incidence occurred in those under 5 years of age, with incidence rates of 8.4 per 100,000 in 1994 and 3.8 per 100,000 in 1995. See Figure 2. In 1995, 4.8 percent were reported to be in child care.

The Eastern health district, which includes St. Louis, had the highest incidence in both years, with a rate of 1.5 per 100,000 in 1994 and 0.8 per 100,000 in 1995. See Figure 3.

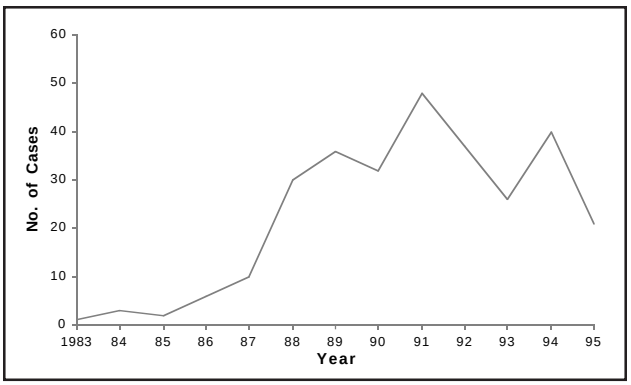


Figure 1. Yersiniosis cases by year, Missouri, 1983–95

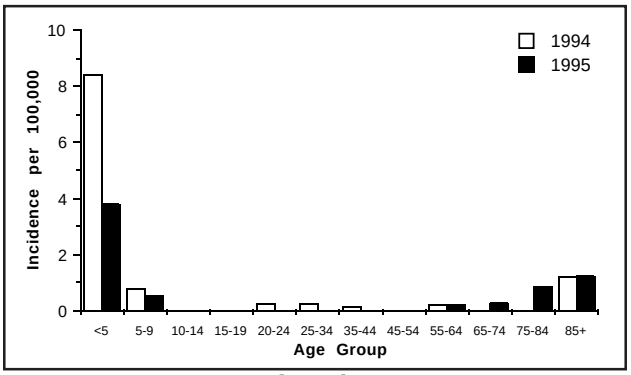


Figure 2. Yersiniosis incidence by age group, Missouri, 1994–95

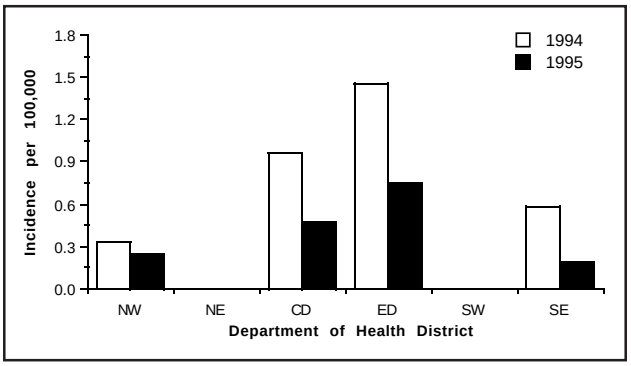


Figure 3. Yersiniosis incidence by health district, Missouri, 1994–95

A high proportion of the cases reported occurred in African-Americans (65.0% in 1994 and 47.6% in 1995). Among cases reported, four (10.0%) were hospitalized in 1994 and four (19.0%) were hospitalized in 1995. There were no deaths in 1994 or 1995. Studies have found cases of yersiniosis associated with household consumption of chitterlings (small intestine), so physicians need to be aware of this illness among infants in black households, especially during traditional holiday periods.

Diseases of the Nervous System

Aseptic Meningitis (Viral meningitis, non-bacterial meningitis)

This is a common disease syndrome of viral origin with multiple etiologies. The disease is characterized by the sudden onset of fever with signs of meningeal involvement, and laboratory findings of pleocytosis, increased levels of protein, normal sugar and the absence of bacteria in the cerebrospinal fluid.

In the United States, the majority of cases of aseptic meningitis is caused by enteroviruses (picornavirus). The incidence of specific types of viruses varies with geographic location and time.

In Missouri, the number of cases of aseptic meningitis remained stable in 1992 and 1993, dipped significantly in 1994 with 175 cases reported, then returned to the 1993 level with 269 cases reported in 1995. See Figure 1.

The highest reported incidence continued to occur in those less than 5 years of age, with incidence rates of 11.3 per 100,000 in 1994 and 12.2 per 100,000 in 1995. Increases occurred in all age groups under 55 in 1995. See Figure 2.

The Southwestern health district had the highest incidence, with a rate of 6.6 per 100,000 in 1994 and 11.7 per 100,000 in 1995. See Figure 3.

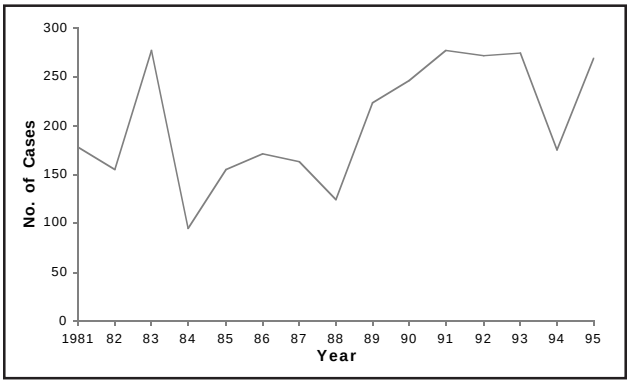


Figure 1. Aseptic meningitis cases by year, Missouri, 1981–95

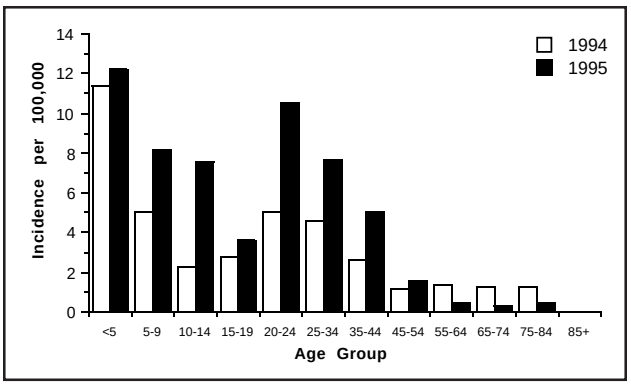


Figure 2. Aseptic meningitis incidence by age group, Missouri, 1994–95

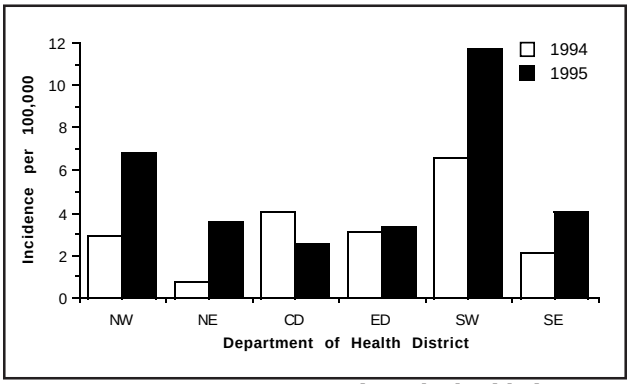


Figure 3. Aseptic meningitis incidence by health district, Missouri, 1994–95

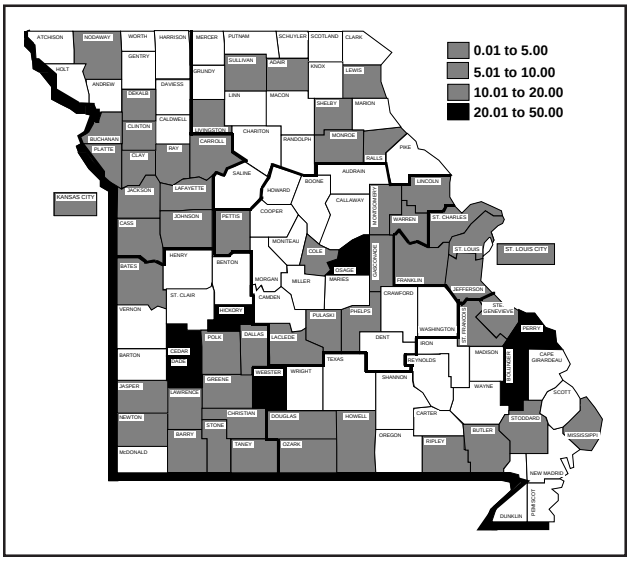


Figure 4. Aseptic meningitis incidence per 100,000 by county, Missouri, 1995

Figure 4 shows the incidence rates by county in 1995.

Meningococcal Disease

Meningococcal disease is an acute bacterial illness with varied signs and symptoms ranging from mild, self-limited fever and muscle aches to rapid onset of prostration, shock and death. Meningococcal meningitis is reported most often, and is characterized by sudden onset of fever with severe headaches, nausea and/or vomiting, and stiff neck. Meningococcal septicemia (bloodstream infection) may develop very rapidly and causes a petechial rash. Other complications include septic arthritis, pneumonia, conjunctivitis and myocarditis.

The infectious agent is *Neisseria meningitidis*, which is carried in the human nasopharynx. A carrier rate of ≥25 percent may occur in the population without any cases of disease. Greatest incidence of disease occurs in the winter and spring. The organism is transmitted by direct contact, including respiratory droplets from the nose and throat. The incubation period varies from two to ten days, usually three to four days. Meningococcal disease occurs most often in very small children and young adults. Individuals lacking certain complement components are at risk to contract or have recurrence of this disease.

In Missouri, only meningococcal meningitis was reportable up through 1993. In 1994, the reporting rule was changed to include other invasive meningococcal illnesses (e.g., meningococcal septicemia, pneumonia). Figure 1 shows the 15-year trend for meningoccocal meningitis with an average of 41 cases per year being reported in the state.

In 1994, there were 43 cases of meningococcal meningitis and 35 cases of other meningococcal illness reported, for a total of 78 cases of meningococcal disease. In 1995, 54 cases of meningococcal meningitis and 22 cases of other meningococcal illness were reported for a total of 76 cases of meningococcal disease.

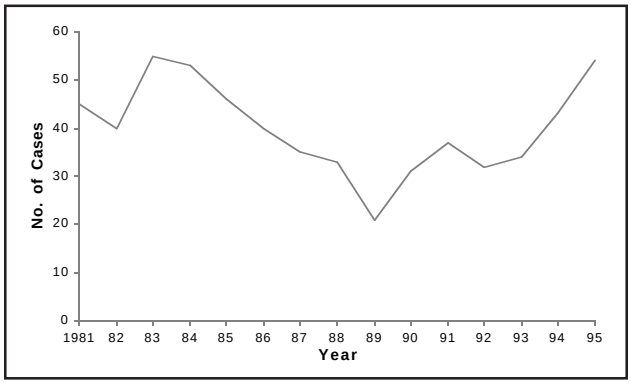


Figure 1. Meningococcal meningitis cases by year, Missouri, 1981–95

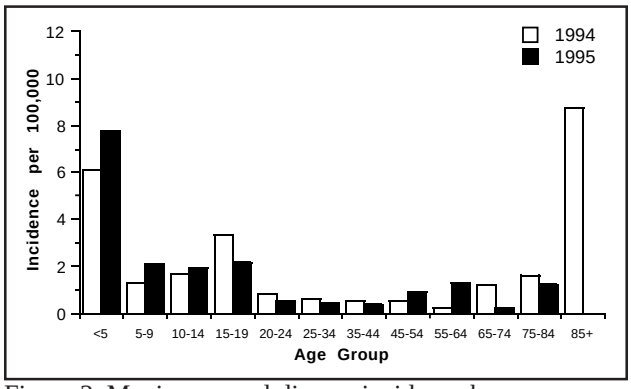


Figure 2. Meningococcal disease incidence by age group, Missouri, 1994–95

The highest incidence of meningococcal disease continues to occur in those less than 5 years of age, with an incidence rate of 6.1 per 100,000 in 1994 and 7.7 per 100,000 in 1995. See Figure 2. In 1995, 11.1 percent of meningococcal meningitis cases were reported to be in child care; no cases of other meningococcal illness were reported to be in child care.

The Southwestern health district had the highest incidence of meningococcal disease with an incidence rate of 2.1 per 100,000 in 1994 and 3.6 per 100,000 in 1995. See Figure 3.

Figure 4 shows the rates of meningococcal disease by county in 1995.

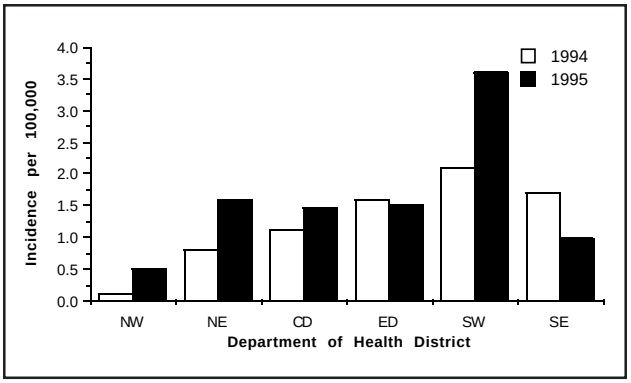


Figure 3. Meningococcal disease incidence by health district, Missouri, 1994–95.

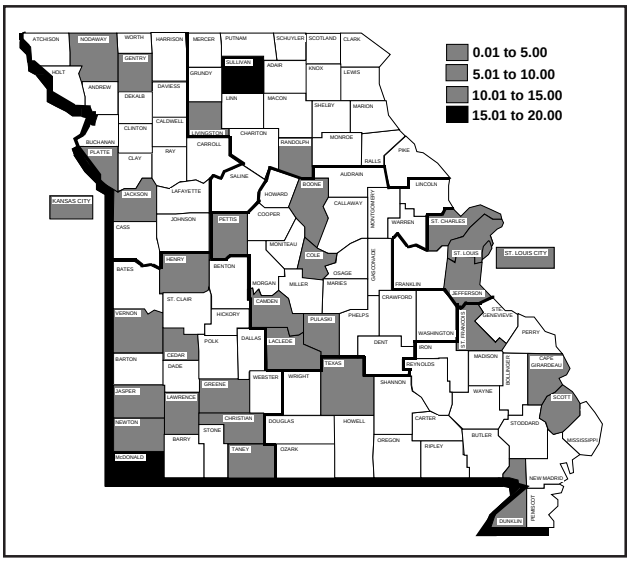


Figure 4. Meningococcal disease incidence per 100,000 by county, Missouri, 1995

Hepatitis

Viral Hepatitis

Viral hepatitis is a collective term used to describe inflammation of the liver resulting from viral infection. Presently, there are four different types of viral hepatitis recognized in the United States: A, B, C, D and E (hepatitis E occurs primarily in countries with inadequate environmental sanitation. In the United States and other developed countries, hepatitis E cases have been documented only among travelers returning from hepatitis E endemic areas). Although the symptoms of hepatitis are similar, they differ in etiology and in immunologic, pathologic and epidemiologic characteristics.

Viral Hepatitis A (Infectious Hepatitis, Epidemic Hepatitis, Epidemic Jaundice, Type A Hepatitis , HAV)

Of all the forms of viral hepatitis present in the United States, hepatitis A and hepatitis E are the only ones transmitted by the fecal-oral route. The infectious agent of hepatitis A is found in the stool, reaches peak levels one to two weeks prior to the onset of symptoms, and declines rapidly after liver dysfunction or symptoms appear. The usual mode of transmission is through direct person-to-person contact with an infected person, including sexual contact and the ritual sharing between users of both injectable and inhalable drugs. Common source outbreaks have been attributed to contaminated water and food handled by infected persons, and raw or under-cooked shellfish harvested from contaminated waters. The incubation period is 15–50 days, with an average of 28–30 days.

Symptoms include fever, malaise, anorexia, nausea, abdominal discomfort and jaundice. The severity of the disease ranges from mild illness lasting one to two weeks, to a severe disabling illness lasting several months. Asymptomatic and mild infection is common, especially in children.

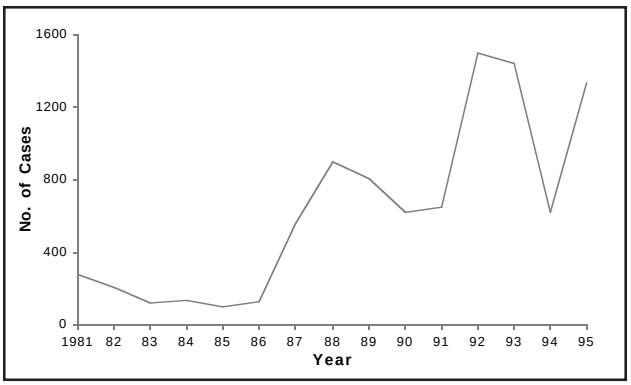


Figure 1. Hepatitis A cases by year, Missouri, 1981–95

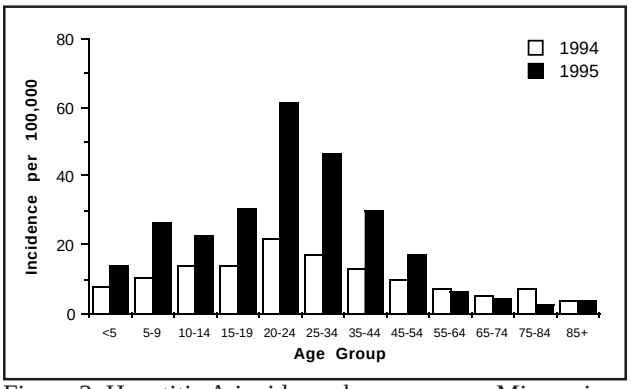


Figure 2. Hepatitis A incidence by age group, Missouri, 1994–95

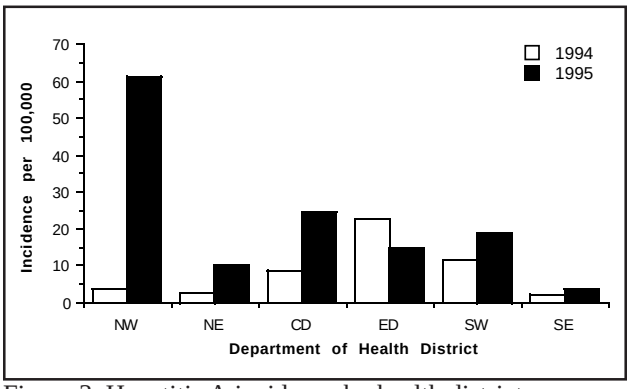


Figure 3. Hepatitis A incidence by health district, Missouri, 1994–95

In 1994, there were 619 reported cases of hepatitis A, an incidence rate of 12 per 100,000. In 1995, the number more than doubled to 1,338 reported cases, a rate of 25.9 per 100,000. See Figure 1.

The highest incidence occurred in the 20–24 year age group, with incidence rates of 21.9 per 100,000 in 1994 and 61.6 per 100,000 in 1995. See Figure 2.

The Eastern health district had the highest incidence rate during 1994 with 22.9 per 100,000. This reflects a community-based outbreak centered in St. Louis City and St. Louis County which peaked during 1992 and 1993. The Northwestern health district had the highest incidence rate during 1995 with 61.4 per 100,000. This reflects an area-wide outbreak, with several of the counties located in the Northwestern health district. See Figures 3 and 4.

Among the cases reported for 1994 and 1995, 378 (19.4%) were hospitalized and there were four deaths for a case fatality rate of three per 1,000.

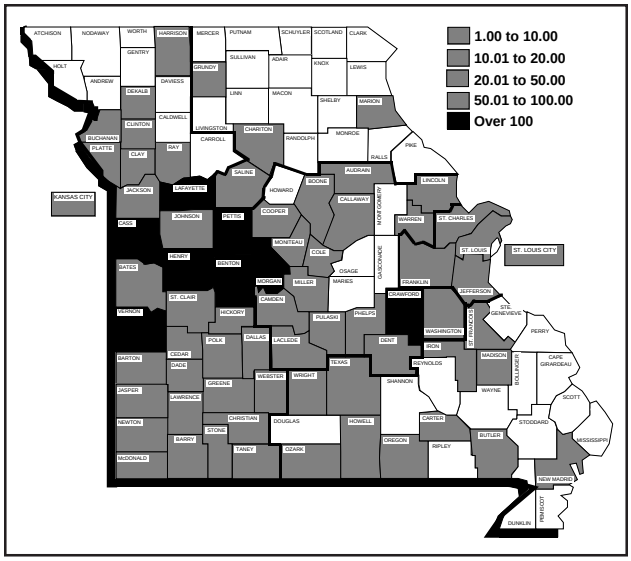


Figure 4. Hepatitis A incidence per 100,000 by county, Missouri, 1995

Viral Hepatitis B (Type B Hepatitis, Serum Hepatitis, HBV)

Hepatitis B is the most common form of bloodborne hepatitis. The virus is transmitted via direct contact with infectious blood and body fluids. The hepatitis B antigen is found in virtually all body secretions and excretions, however, only blood, saliva, semen and vaginal fluids have been shown to be infectious. Infection can occur through sexual contact, IV drug use, occupational exposure in healthcare settings, perinatal exposure and household contact with a carrier. It can be prevented through immunization.

In Missouri, there were 538 acute cases of hepatitis B reported in 1994 and 437 acute cases reported in 1995. Hepatitis B continues to decline, despite an increase in 1993. See Figure 1.

The highest reported incidence in 1994 was among the 20–24 age group, with a rate of 19.4 per 100,000. In 1995, the highest incidence was among the 35–44 age group, with a rate of 16.5. See Figure 2.

The Eastern health district had the highest incidence in 1994 with a rate of 19.8 and in 1995 with a rate of 14.5 per 100,000. See Figure 3.

Figure 4 shows the incidence rates by county in 1995. St. Louis City and Polk County had the highest incidence with respective rates of 55.9 and 22.9 per 100,000.

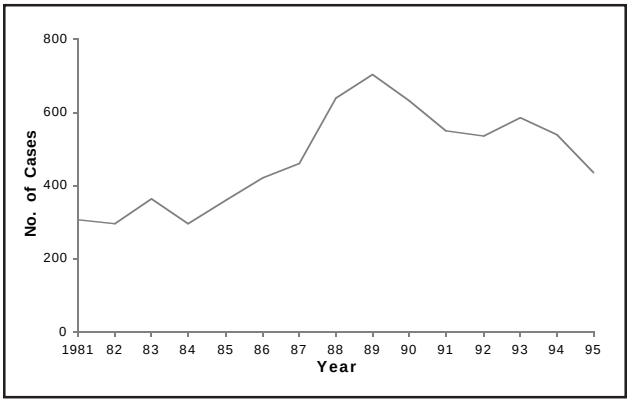


Figure 1. Hepatitis B cases by year, Missouri, 1981–95

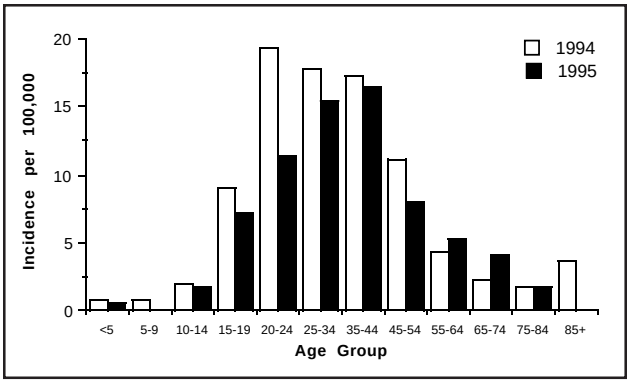


Figure 2. Hepatitis B incidence by age group, Missouri, 1994–95

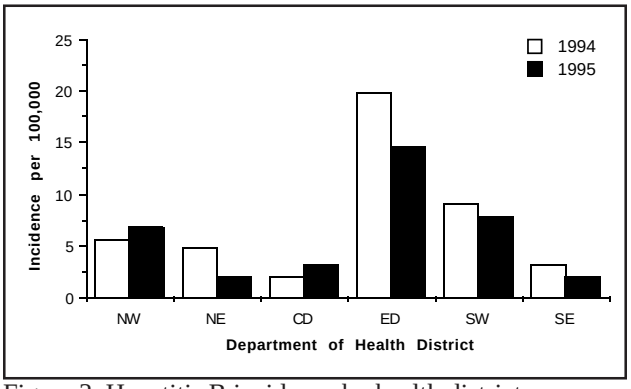


Figure 3. Hepatitis B incidence by health district, Missouri, 1994–95

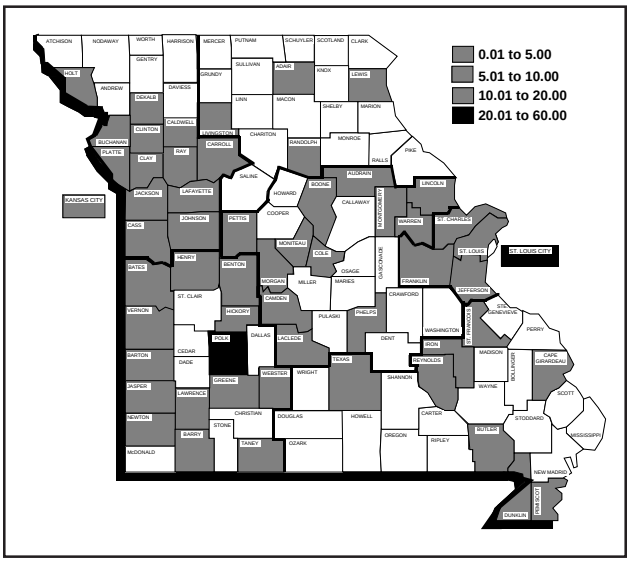


Figure 4. Hepatitis B incidence per 100,000 by county, Missouri, 1995

Among reported cases for 1994 and 1995, 108 (11.1%) were hospitalized and there were two deaths for a case fatality rate of 2.1 per 1,000.

Hepatitis B Surface Antigen (HBsAg) Positive Pregnant Women Only

In 1993, the Missouri legislature amended state statute 210.030 to require blood testing of pregnant women for hepatitis B and to require the administration of the appropriate doses of hepatitis B vaccine and HBIG within twelve hours of birth to infants born to mothers who are hepatitis B positive. The Department of Health's reporting rule (19 CSR 20-20.020) was amended to make positive hepatitis B screening of pregnant women (prenatal HBsAg) reportable effective March 30, 1995.

Because infants born to HBsAg-positive mothers are exposed to the hepatitis B virus at birth, there is a compelling reason to track these infants. When a report of a HBsAg-positive pregnant woman is received, contacts (household, sexual or needlesharing) are identified by the woman. Contacts are then offered testing and provided HBIG and hepatitis B vaccine as medically indicated. Infants born to HBsAg-positive mothers are given HBIG and the three-dose vaccine series. Three to six months after the newborn has completed the vaccine series, a follow-up serology (anti-HBs) is offered. Follow-up of all contacts typically requires 12–18 months to complete.

In 1995, 61 HBsAg-positive pregnant women were reported in Missouri. See Figure 1. Figure 2 shows those reports by race. Asians had the highest incidenec rate per 100,000 population at 41.2 compared with African Americans at 4.0 and whites at .5 per 100,000.

Follow-up identified 145 contacts, 96 of whom were screened for total core antibody (anti-HBc). Of the 96 contacts screened, 30 tested positive and treatment was not warranted. The remaining 66 contacts tested negative and 62 completed the hepatitis B vaccine series; treatment is still in progress for four contacts.

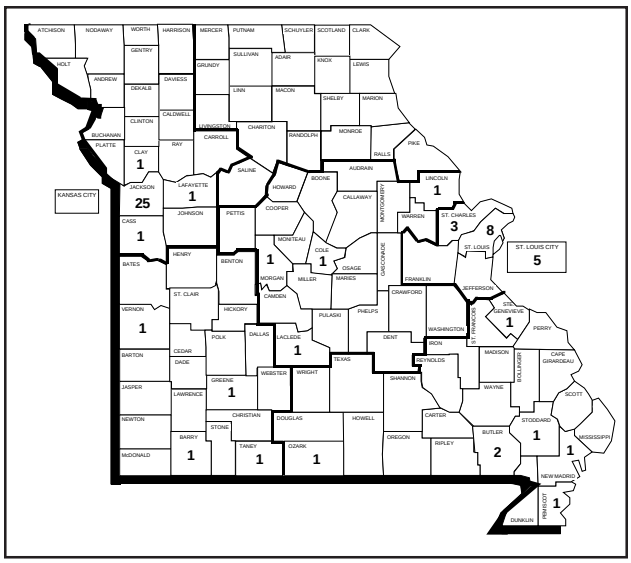


Figure 1. Reported HBsAg-positive pregnant women by county, Missouri, 1995

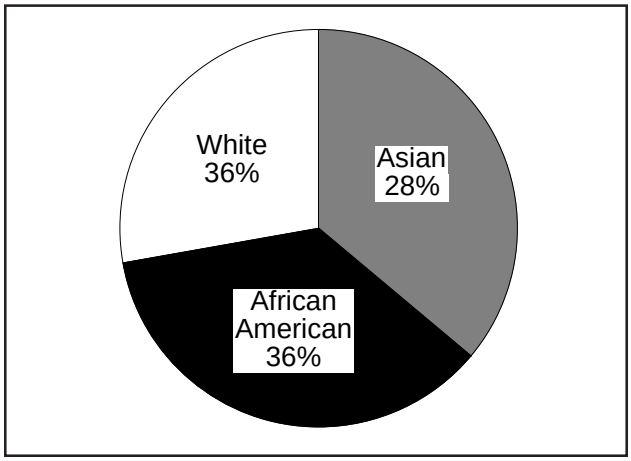


Figure 2. Reported HBsAg-positive pregnant women by race, Missouri, 1995

There were 48 live births to HBsAg-positive women in 1995. Of these, 40 infants (83%) completed their HBIG and vaccine series. Thirteen infants (27%) had 12-month anti-HBs screening. All 13 infants tested positive, indicating protective antibody levels.

Based upon estimates from the Centers for Disease Control and Prevention, Missouri should have an average of 240 HBsAg-positive women reported each year. Since Missouri received only

59 reports in 1995, HBsAg-positive women are undoubtedly underreported in Missouri. Reliable information regarding the number of affected women depends upon several factors including:

- awareness of the risks and policies that address appropriate assessment, testing and interventions;
- qualified, valid laboratory services; and
- reliable reporting of results.

The success of any perinatal immunization program can be measured by its ability to effectively identify, track and monitor the population at risk and to assure appropriate interventions. Ideally, a perinatal immunization program should have several overlapping sources of information to identify HBsAg prenatal cases: the laboratory, the prenatal care provider and the delivery hospital.

Non-A Non-B Hepatitis (NANB) (includes Hepatitis C)

Non-A Non-B (NANB) hepatitis is a diagnosis of exclusion. Most NANB hepatitis in the United States is probably caused by the recently described hepatitis C virus; an unknown proportion may be due to other agents. NANB hepatitis includes both transfusion-associated disease and community-acquired disease. Intensive surveillance in four United States counties indicates the number of hepatitis C cases associated with blood transfusions or intravenous drug abuse has been decreasing. These four counties report that blood transfusions account for only four percent of cases and intravenous drug abuse accounts for 25–38 percent of hepatitis C cases. The serologic tests for hepatitis C antibodies are not helpful in diagnosing acute disease because there my be a prolonged interval between disease onset and detection of antibodies.

The diagnosis of acute NANB hepatitis, therefore, still relies on testing to rule out hepatitis A and B, an increase in liver enzyme tests to two and one-half times normal, and supplementary tests. In addition, the Centers for Disease Control and Prevention require (for reporting purposes) that hepatitis C be clinically apparent or symptomatic in the acute phase. This is problematic because clinical symptoms occur in only 30–40 percent of the cases.

In Missouri, 32 cases that met the CDC case definition for acute NANB hepatitis were reported in 1994 and 23 cases reported in 1995. See Figure 1.

The highest reported incidence occurred in the 35–44 year group in 1994 and 1995, with an incidence rate of 1.8 and 1.1 per 100,000 respectively. See Figure 2.

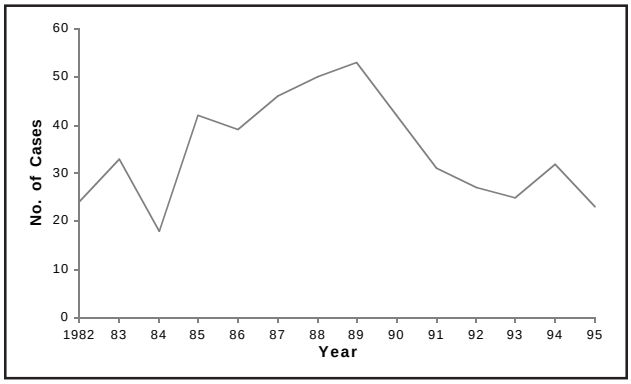


Figure 1. Hepatitis Non-A Non-B cases by year, Missouri, 1982–95

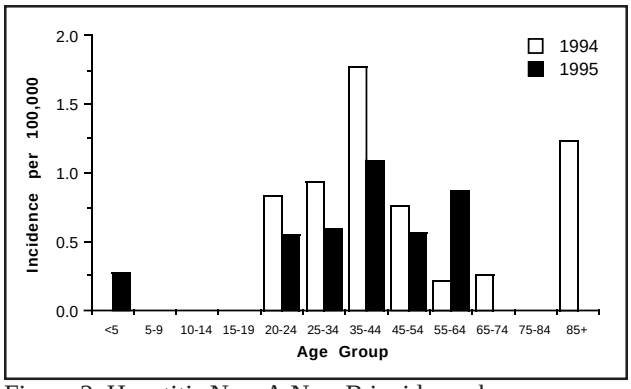


Figure 2. Hepatitis Non-A Non-B incidence by age group, Missouri, 1994–95

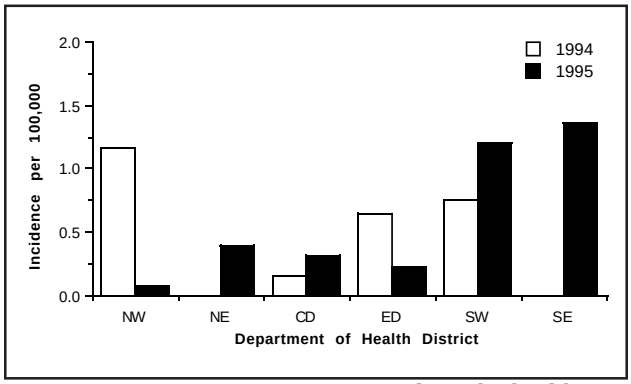


Figure 3. Hepatitis Non-A Non-B incidence by health district, Missouri, 1994–95

The geographic distribution by health district is shown in Figure 3. The Northwestern health district had the highest incidence in 1994 with a rate of 1.2 per 100,000. The Southeastern health district had the highest incidence in 1995 with a rate of 1.4 per 100,000.

Figure 4 shows the incidence rates by county in 1995.

Among the reported cases, 8 (25.0%) were hospitalized in 1994 and 13 (56.5%) were hospitalized in 1995. There were no reported deaths for 1994 or 1995.

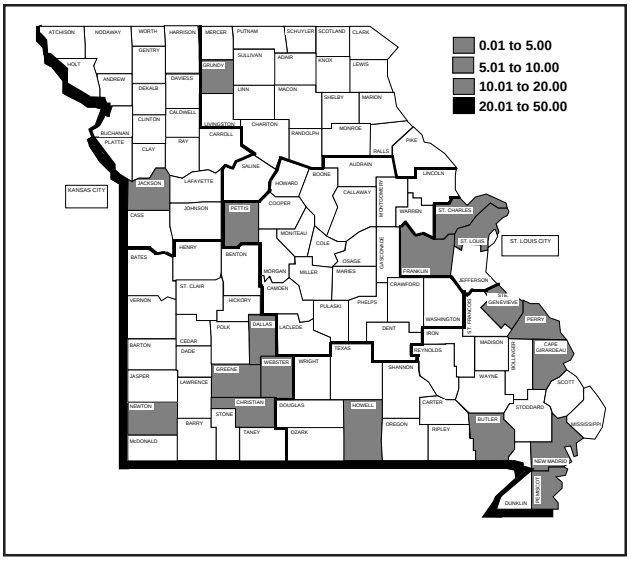


Figure 4. Hepatitis Non-A Non-B incidence per 100,000 by county, Missouri, 1995

Vaccine-Preventable Diseases

Diphtheria

Diphtheria is an acute bacterial disease of the tonsils, pharynx, larynx and nose, occasionally of other mucous membranes or skin, and sometimes the conjuntivae or genitalia. The characteristic lesion, caused by the release of a specific cytotoxin, is an adherent grayish membrane with a surrounding inflammation.

The infectious agent is *Cornyebacterium diphtheriae,* which produces the cytotoxin. A disease of colder months in temperate zones, it involves primarily older children under 15 years of age, but is also found among adult populations in which immunization was neglected. Formerly a common disease, it has largely disappeared in areas where effective immunization programs have been carried out. The disease is transmitted from person to person through droplets from the respiratory system and through contact with the lesion or articles contaminated with the discharges from cases or carriers.

In Missouri, there have been no reported cases of diphtheria since 1979.

Haemophilus influenzae, type B (Hib)

Haemophilus influenzae is a leading cause of serious systemic bacterial disease in the United States. It was the most common cause of bacterial meningitis, accounting for an estimated 8,000–11,000 cases annually until the early 1990s. It occurs primarily among children less than 5 years of age. The mortality rate is two to eight percent, even with currently available antimicrobial therapy, and neurologic sequelae are observed in as many as 15-45 percent of survivors. Most cases of *H. influenzae* meningitis among children are caused by strains of type b (Hib). Symptoms of the Hib meningitis syndrome may include the following: fever, vomiting, lethargy and meningeal irritation in infants and stiff neck and back in older children. Progressive stupor or coma is common and occasionally there is a low-grade fever with central nervous system involvement.

In addition to bacterial meningitis, Hib is responsible for other invasive diseases, including epiglottitis, sepsis, cellulitis, septic arthritis, osteomyelitis, pericarditis and pneumonia. Non-typeable strains of *H. influenzae* colonize the human respiratory tract and are a major cause of otitis media and respiratory mucosal infection, but rarely result in bacteremic disease. Hib is spread by droplets and discharges from the nose and throat.

The incidence of Hib meningitis has decreased since the introduction of vaccines in 1986 in Missouri to seven cases in 1994 and ten cases in 1995. See Figure 1.

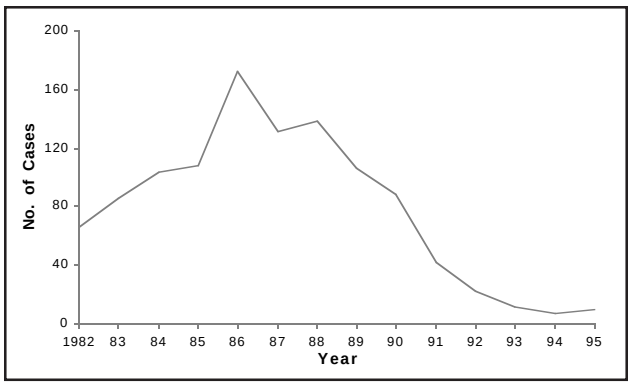


Figure 1. Hib meningitis cases by year, Missouri, 1982–95

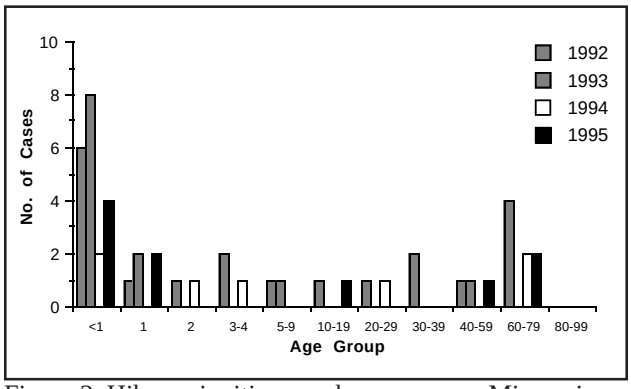


Figure 2. Hib meningitis cases by age group, Missouri, 1992–95

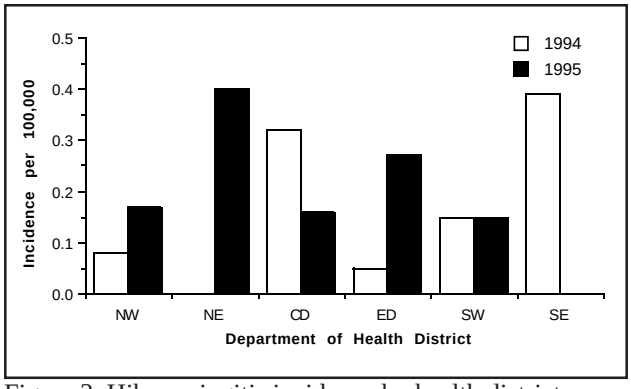


Figure 3. Hib meningitis incidence by health district, Missouri, 1994–95

The new conjugate vaccines continue to be effective in the very young as demonstrated by the reduction in the number of cases in that age group. Case counts are so low that we may see changes or upswings in incidence due to random variation rather than true increases. Incidence of the disease continues to be highest among the youngest age group and may reflect missed opportunities for vaccination in the very young. See Figure 2.

Incidence was highest in the Southeastern health district in 1994 with a rate of 0.4 per 100,000 and in the Northeastern health district in 1995 with a rate of 0.4 per 100,000. See Figure 3.

Meningitis is a serious condition and all cases of Hib meningitis for 1994 and 1995 were hospitalized. Among the 17 cases, there were no deaths reported.

Invasive Hib disease other than meningitis became reportable in Missouri in 1990 and in 1996 we will have a sufficient baseline data to describe trends for this condition. There were 44 cases of these other invasive Hib diseases reported in 1994 and 18 reported in 1995.

Influenza

Influenza is an acute viral disease of the respiratory tract. Symptoms include sudden onset of fever, sore throat, muscle aches and a nonproductive cough. Influenza is spread by direct contact with an infected person, or by airborne droplets. Persons are most infectious during the 24 hours before they develop symptoms and may be infectious for up to seven days (usually 3-5 days from onset of symptoms). The incubation period is usually one to three days.

Epidemics of influenza can rapidly evolve with widespread morbidity and serious complications, including viral and bacterial pneumonia. The mortality rate is usually higher in the elderly and those debilitated by chronic cardiac, pulmonary, renal or metabolic disease, anemia, or immunosuppression.

The first laboratory-confirmed case of the 1994-95 season was reported on January 5, 1995. There were 389 laboratory-confirmed cases of influenza reported. Three hundred and seventy-seven (97%) were type A, with 37 subtyped as H3N2; 12 (3%) were type B with one subtyped as B/Panama-like. Reports of influenza-like illness peaked during week 10 and then declined to baseline levels. See Figure 1. Pneumonia and influenza deaths increased during weeks 11 through 14. See Figure 2. This season was characterized by outbreaks in a variety of settings: six in long-term care facilities with three confirmed as type A (one subtyped as H3N2); five in schools with three closings (none laboratory confirmed); and one in employees of a home health agency (not laboratory confirmed).

Influenza activity in Missouri during the 1995-96 season was related to both type A and type B influenza. There were 384 laboratory-confirmed cases reported. Of these, 307 (80%) were type A with 70 subtyped as H1N1 and 12 subtyped as H3N2; 77 (20%) were type B, with eight subtyped as B/Beijing-like. The number of cases of

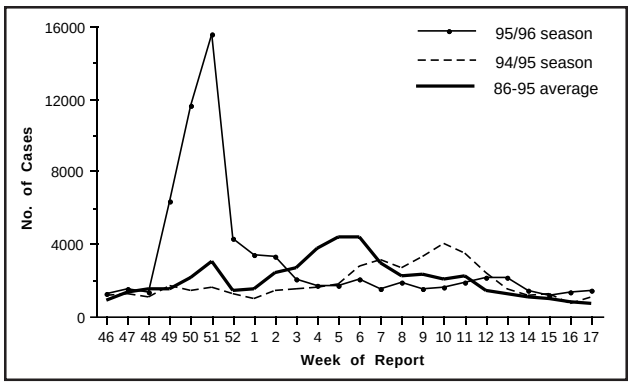


Figure 1. Influenza-like illness by week of report, Missouri, 1995–96, 1994–95 and 1986–95 average

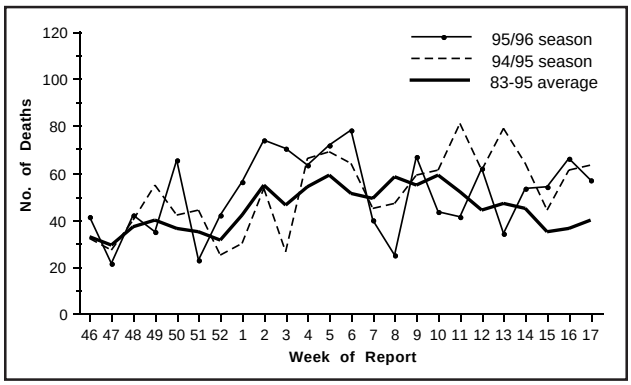


Figure 2. Pneumonia and influenza deaths by week of report, Missouri, 1995–96, 1994–95 and 1983–95 average

influenza-like illness reported for the season was 74,073, considerably higher than the 44,198 reported during the 1994-95 season. Influenza-like illness incidence peaked early in the season in week 51. See Figure 1. The total number of deaths for the season was 1,224, which is down slightly from the 1,238 reported during the 1994-95 season. Deaths fluctuated during the season with minor peaks occurring during weeks 2 through 6. See Figure 2. There were many outbreaks of influenza-like illness reported this season including: 49 in schools (four confirmed as type A with three of these subtyped H1N1); two in universities (one had confirmed type A (H1N1) and type A (H3N2) and the other had confirmed type A (H3N2) and type B/Beijing-like); three in long term care facilities (none confirmed); one in a preschool (unconfirmed); and one community-wide outbreak confirmed as type B/Beijing-like.

Measles (Rubeola, Hard Measles, Red Measles, Morbilli)

Measles is an acute, highly communicable viral disease. The mode of transmission is by airborne droplet spread, direct contact with nasal or throat secretions of infected persons and, less commonly, by articles freshly soiled with nose and throat secretions. Measles is one of the most highly communicable infectious diseases.

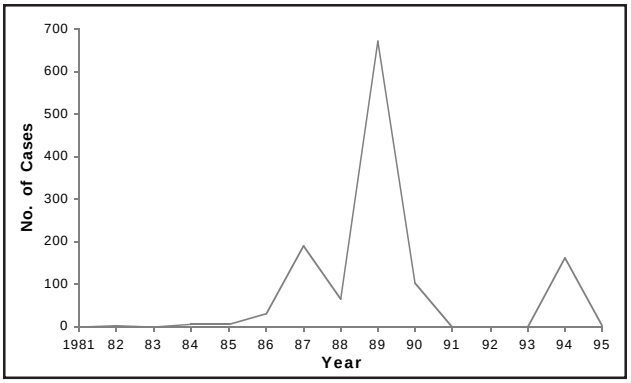


Figure 1. Measles cases by year, Missouri, 1981–95

From exposure to onset of prodrome averages 10–12 days. From exposure to rash onset averages 14 days. All persons who have not had the disease or been successfully immunized are susceptible. Acquired immunity after disease is permanent. Infants born of mothers who have had the disease are immune for approximately the first six to nine months or more. Vaccination at age 12–15 months produces immunity in 95–98 percent of recipients; revaccination may produce immunity levels as high as 99 percent.

Missouri experienced low incidence of measles in the years 1981–88, with an average of 30 cases reported per year. In 1989, there was a dramatic increase to 671 reported cases. See Figure 1. There were 161 reported cases of measles in 1994, but 156 of these were associated with an outbreak in a church boarding school whose members usually claim a religious exemption. Although the cases were unrelated, both 1995 cases were immunized teenagers in the Central District whose acute serology tests were positive for measles IgM but whose convalescent sera were negative for measles IgG antibody. Although they met the national clinical case definition for measles, it is possible that they represent "false positive" laboratory test results.

One dose of live measles vaccine received by injection on or after the first birthday is required for school attendance for all children who began kindergarten prior to the 1990–91 school year. All children beginning kindergarten who were 5/6 years of age at the beginning of the 1990–91 school year are required to have two doses of live measles vaccine by injection. At this time, it is recommended that all college freshman receive one dose of live measles vaccine prior to entering a college or university.

Mumps (Infectious parotitis)

Mumps is an acute viral disease characterized by swelling and tenderness of one or more of the salivary glands, usually the parotid and sometimes the sublingual or submaxillary glands. The central nervous system is frequently involved, usually as aseptic meningitis, almost always without sequelae. Other possible complications include encephalitis, orchitis, pancreatitis, neuritis, arthritis, mastitis, nephritis, thyroiditis and pericarditis. The mode of transmission is by droplet spread or direct contact with saliva of an infected person. The incubation period is about 12–25 days with an average of 18 days.

In Missouri, the 15 year trend shows that mumps incidence has been below 100 cases per year since 1981 with a peak of 87 cases occurring in 1989. There were 44 cases reported in 1994 and 25 in 1995. See Figure 1.

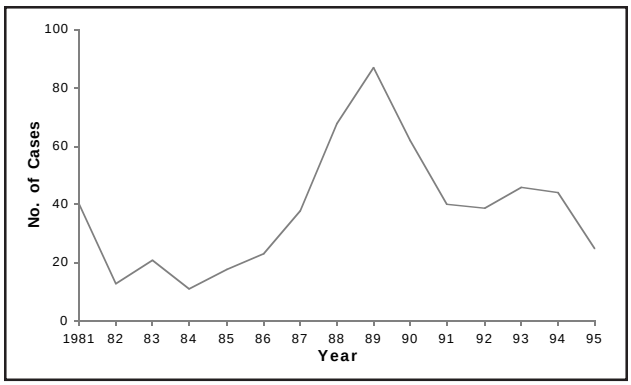


Figure 1. Mumps cases by year, Missouri, 1981–95

Pertussis (Whooping Cough)

Pertussis (whooping cough) is a highly contagious bacterial disease, involving the respiratory tract. Pertussis has an infection rate of up to 90 percent in non-immune household contacts. The disease is most often due to exposure to older siblings and adults with mild or atypical illness. During the first year of life, pertussis can be a particularly severe illness, with complications that include pneumonia, seizures and encephalopathy. More than 50 percent of children less than one year of age reported to have pertussis are hospitalized. In infants less than 6 months of age, the case fatality rate is approximately one percent.

In Missouri, 63 cases of pertussis were reported in 1995, an increase from 45 cases in 1994. See Figure 1. Cases occurred in all health districts of the state and did not appear to be epidemiologically linked. See Figure 2. Forty of the cases (63%) occurred in infants 6 months of age and under.

Cases of pertussis continue to occur only partially because of incomplete immunization coverage. Babies may be infected by older children and adults whose immunity to pertussis has waned. Multiple doses of vaccine and regular boosters are required for children under 7 years of age, limiting the usefulness of vaccination as a measure for outbreak control. Continued research is needed to develop a pertussis vaccine which is safe and effective for those 7 years of age in order to further reduce the incidence of pertussis.

The Advisory Committee on Immunization Practices (ACIP) recommends the use of acellular pertussis containing vaccine. Tripedia manufactured by Connaught can be used for the first four doses of the DTP vaccination series. Acel-Immune manufactured by Wyeth-Lederle can be used for the full five-dose DTP/DTAP series.

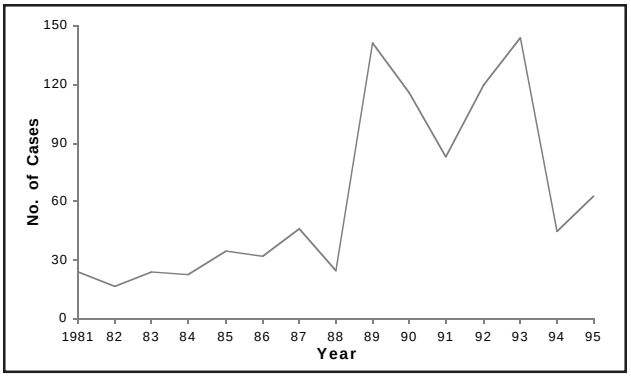


Figure 1. Pertussis cases by year, Missouri, 1981–95

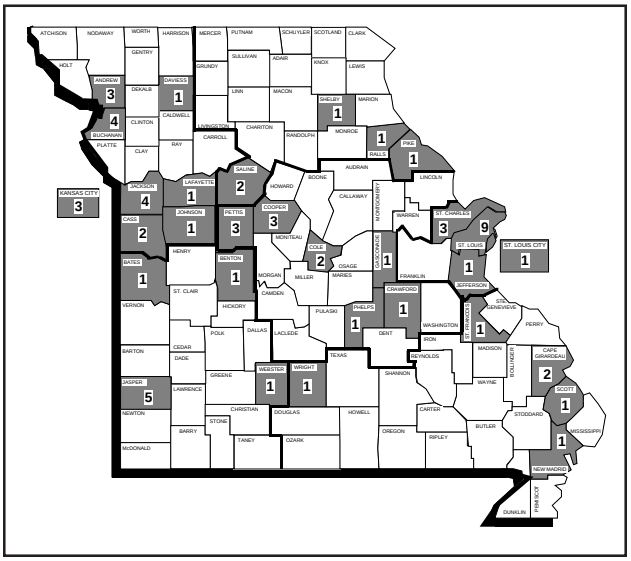


Figure 2. Pertussis cases by county, Missouri, 1995

Poliomyelitis, Acute (Polioviral fever, Infantile paralysis)

Poliomyelitis is an acute viral infection with severity ranging from inapparent infection to nonspecific febrile illness, aseptic meningitis, paralytic disease and death. Poliovirus types 1, 2 and 3 (genus *Enterovirus*) are all capable of causing infection, illness and paralysis.

Missouri has not had a case of poliomyelitis reported since 1988. See Figure 1.

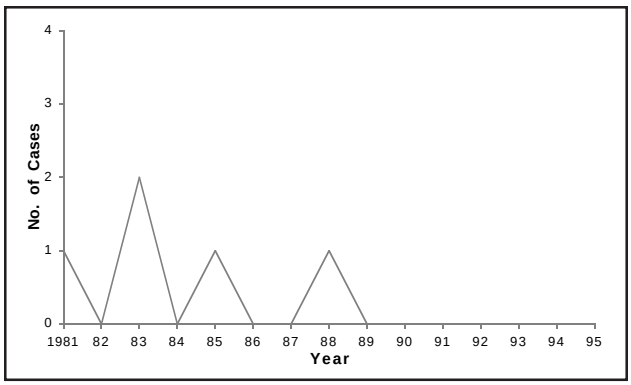


Figure 1. Poliomyelitis cases by year, Missouri, 1981–95

The United States has not reported an indigenous case of polio since 1979. The Americas were declared polio-free in September 1994. Nonetheless, an estimated 110,000 polio cases and 11,000 deaths occurred worldwide in 1993. The Missouri Department of Health continues to support the current Advisory Committee on Immunization Practices (ACIP) recommendations for polio protection.

Two polio vaccines are currently licensed in the United States: inactivated polio virus vaccine (IPV) and oral poliovirus vaccine (OPV). The following schedules are all acceptable by the Advisory Committee on Immunization Practices, the American Academy of Pediatrics and the American Academy of Family Physicians:

- IPV at ages 2 and 4 months
  OPV at age 12–18 months
  and at age 4–6 years;

- IPV at ages 2 months, 4 months and 12–18 months and at age 4–6 years; **or**

- OPV at ages 2 months, 4 months and 6–18 months and at age 4–6 years.

Rubella (German Measles)

Rubella is a mild febrile disease with diffuse punctate and maculopapular rash, sometimes resembling that of measles or scarlet fever. Children usually present with no well-defined symptoms. However, adults may experience symptoms of low-grade fever, headache, malaise, mild coryza and conjunctivitis. Up to 50 percent of the infections can occur without rash.

Congenital rubella syndrome occurs in greater than 25 percent of the women who contract rubella during the first trimester of pregnancy. The risk of a single congenital defect falls to 10–20 percent by the 16th week of pregnancy, and congenital defects are rare when the infection occurs after the 20th week. Fetuses infected early are at the greatest risk of intrauterine death, spontaneous abortion and congenital malformation of major organ systems. Congenital defects can be single or multiple.

Missouri had two reported cases of rubella in 1994 and none in 1995; and has had five or fewer cases each year since 1986. See Figure 1. Rubella rates are very low due to high immunization coverage.

One probable case of congenital rubella syndrome was reported in a baby born in 1995. The mother of the infant reported no rash illness during her pregnancy, but the infant is deaf and had sera positive for rubella IgM antibody.

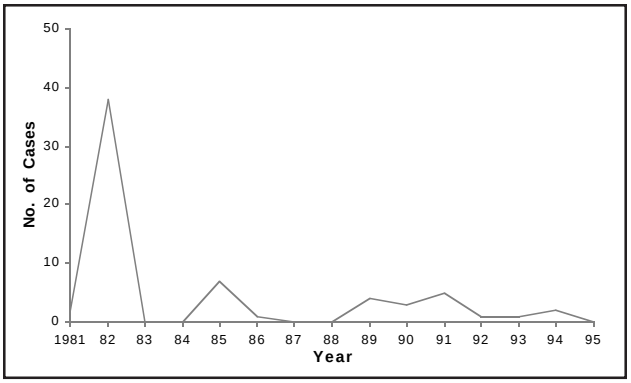


Figure 1. Rubella cases by year, Missouri, 1981–95

Sexually Transmitted Diseases

Chlamydia trachomatis Infections

Chlamydia trachomatis is a bacterial organism responsible for a wide range of sexually transmitted disease manifestations, including non-gonococcal urethritis (NGU) and mucopurulent cervicitis (MPC). The clinical manifestations of genital disease caused by this organism are indistinguishable from gonorrhea. Asymptomatic infection may be found in 1–25 percent of sexually active men. The possible complications of infection in the male include epididymitis, infertility and Reiter syndrome. In females, 60–80 percent of chlamydial infections may be asymptomatic. Clinical manifestations include mucopurulent endocervical discharge, with edema and inflammation of the endocervical epithelium. Complications of the infection in females include pelvic inflammatory disease, ectopic pregnancy and infertility.

In Missouri, the number of reported cases of *C. trachomatis* infection was 11,625 in 1993. This number increased by 5.3 percent to 12,244 in 1994, and then decreased 1.3 percent to 12,084 cases reported in 1995. See Figure 1.

In 1994, 11,195 (91.4%) of the reported cases were in females and 1,049 (8.6%) were in males. In 1995, 10,843 (89.7%) of the reported cases were in females and 1,241 (10.3%) were in males. The majority of the reported cases in 1994 and 1995 are in females because cases discovered through the Infertility Prevention Project account for a large proportion of the reported cases. In 1994, 37.6 percent (4,607) of the total reported cases were from the Infertility Prevention Project, and in 1995, 45.9 percent (5,543) were from the project. Of the 4,607 cases idenified through the project in 1994, 4,362 (94.7%) were in females and 245 (5.3%) were in males. Of the 5,543 cases in 1995, 5,034 (90.8%) were in females and 509 (9.2%) were in males. The Infertility Prevention Project is a collaborative effort implemented in 1993 between STD and family planning clinics to prevent infertility in females because of sexually transmitted diseases. Males are tested at the STD clinics but not at the family planning clinics.

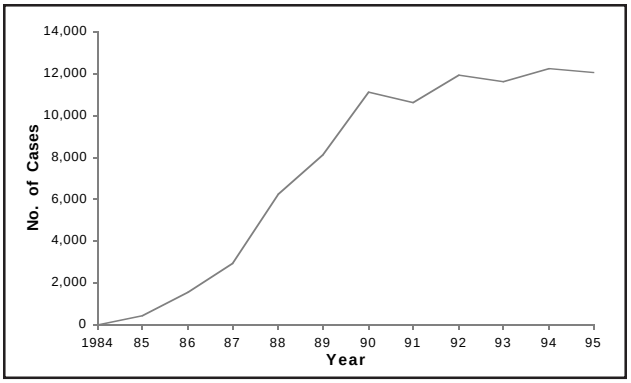


Figure 1. *Chlamydia trachomatis* cases by year of report, Missouri, 1984–93

Widespread use of treatment based on clinical symptoms, dual treatment of gonorrhea cases (gonorrhea therapy plus chlamydia therapy, which has been recommended since 1988), and increased screening for chlamydia (since 1987) may all be contributing to the flattening of the incidence curve for chlamydia since 1990.

Genital Herpes

Genital herpes is a sexually transmitted disease caused by the herpes simplex virus (HSV). Genital herpes is usually caused by HSV-2, although it can also be caused by HSV-1. Typical symptoms include painful blisters or sores in the genital area, which may be accompanied by fever, swollen lymph nodes and aching muscles. Symptoms are likely to recur, although such recurrences tend to be less severe than the initial infection. Asymptomatic infections also occur. Transmission often occurs from unrecognized lesions or during asymptomatic viral shedding.

The primary mode of transmission of HSV-1 is by contact with saliva of infected carriers. Transmission of HSV-2 is usually by sexual contact. Both types can be transmitted to various sites by oral-genital or oral-anal contact.

In Missouri, reported cases of genital herpes decreased 7.2 percent from 3,729 cases in 1993 to 3,480 in 1994, and then increased 0.6 percent to 3,500 cases in 1995.

Genital herpes is no longer a reportable disease in Missouri as of April 30, 1996.

Gonorrhea

Gonorrhea includes a number of inflammatory conditions of the genitourinary tract caused by *Neisseria gonorrhoeae*. Gonorrhea is a sexually transmitted, bacterial disease which affects epithelial tissues, and it has different manifestations in men and women.

In females, urethritis or cervicitis develops a few days after exposure to the infecting organism. These cases are usually so mild that they frequently go unnoticed (75–80 percent of gonococcal infections in women may be asymptomatic). Complications in women include pelvic inflammatory disease, peritonitis and ectopic pregnancy. In males, 10 percent or more of gonococcal infections may be asymptomatic. Complications in men include prostatitis and epididymitis. Anorectal and pharyngeal infections occur in both sexes. Conjunctivitis, which rarely occurs in adults, can cause blindness in infants if not treated rapidly.

In Missouri, the reported incidence of gonorrhea decreased by 4.5 percent from 13,147 cases in 1993 to 12,554 cases in 1994, and then further decreased by 10.0 percent to 11,302 cases in 1995. See Figure 1. The statewide incidence rate in 1995 was 220.9 per 100,000. St. Louis City, St. Louis County and Outstate Missouri reported decreases in gonorrhea incidence from 1994 to 1995 of 16 percent, 16 percent and 12 percent, respectively. Kansas City reported a six percent increase in gonorrhea cases from 1994 to 1995, which could reflect a slight growth in the actual number of gonococcal infections in the community, or could be the result of changes in diagnostic, reporting and/or surveillance practices. See Figure 2.

Gonorrhea was reported from all health districts in Missouri during 1995, with the highest incidence occurring in the major urban areas. See Figure 3.

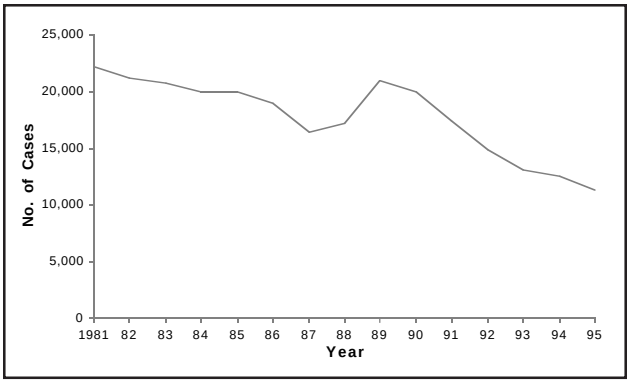


Figure 1. Gonorrhea cases by year of report, Missouri, 1981–95

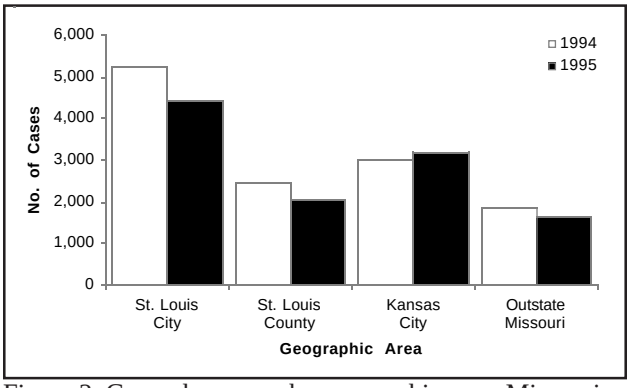


Figure 2. Gonorrhea cases by geographic area, Missouri, 1994–95

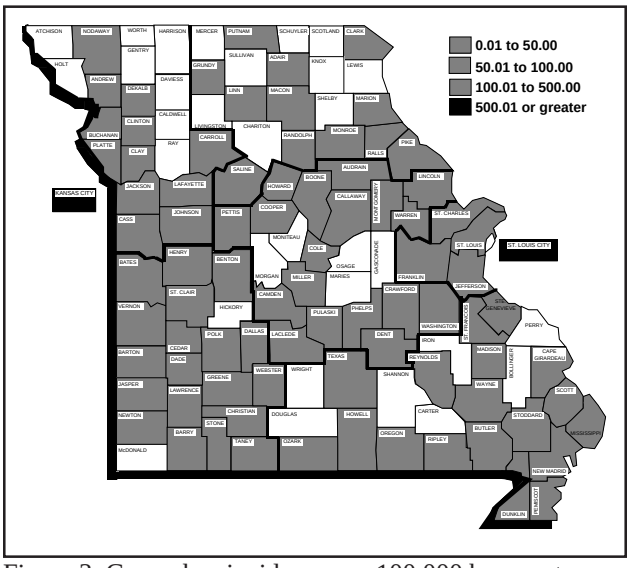


Figure 3. Gonorrhea incidence per 100,000 by county, Missouri, 1995

Gonococcal Pelvic Inflammatory Disease (GPID) (Gonococcal Salpingitis)

Pelvic inflammatory disease, or acute salpingitis, is a common complication of gonorrhea in women. GPID has a major impact because of its acute manifestations and its potential long-term effects of pelvic discomfort and pain, infertility and ectopic pregnancy. Patients with salpingitis have symptoms of lower abdominal pain, abnormal menses and painful coitus.

In Missouri, reported cases of GPID increased 5.9 percent from 269 cases in 1993 to 286 cases in 1994, and then decreased 59.4 percent to 133 cases in 1995.

Penicillinase-producing *Neisseria gonorrhea* (PPNG)

Over time, *Neisseria gonorrhoeae* has become resistant to treatment with penicillin, ampicillin, amoxicillin, tetracycline, doxycycline and erythromycin in much of the United States. The resistance is due to the plasmid-mediated production of beta-lactamase as well as chromosomal-mediated resistance. With the significant levels of resistance identified in United States, it is imperative that all strains of *N. gonorrhoeae* be treated with regimens proven to be curative. Since all gonorrhea is now treated as if it is resistant, beta lactamase testing is no longer recommended.

National microbial resistance is monitored by the National Gonoccocal Isolate Surveillance Project (GISP). Isolates are sent to the Centers for Disease Control reference laboratory from both St. Louis and Kansas City. Specimens tested from St. Louis are exhibiting more resistance to the above referenced medications than are the ones submitted from Kansas City (39.79% and 6.25% respectively).

Ciprofloxacin resistant strains of *N. gonorrhoeae* have been identified in Denver, Honolulu, San Francisco and Seattle. Strains exhibiting decreased ciprofloxacin susceptibility have been identified in Albuquerque, Anchorage and Long Beach and Orange County, California. No ciprofloxacin resistance has been noted in Missouri; however, the minimum inhibitory concentrations (MICs) required to cure *N. gonorrhoeae* have increased slightly in St. Louis.

All isolates submitted for testing have been susceptible to both spectinomycin and ceftriaxone when administered at recommended dosages.

Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS)

Human immunodeficiency virus (HIV) is a retrovirus which is transmitted from person-to-person through sexual contact, blood-to-blood contact (such as the sharing of HIV-contaminated needles and syringes by injecting drug users) and from an infected mother to her infant before or at the time of birth.

Acquired immunodeficiency syndrome (AIDS) is a specific group of diseases and conditions indicative of severe immunosuppression related to HIV infection. The clinical manifestations of HIV infection, unlike those of most other reportable diseases, do not usually develop until years after the infection. The average time between infection with HIV and a diagnosis of AIDS is approximately eight to ten years. This long incubation period makes it difficult to determine the epidemiology of new HIV infections based on reported AIDS cases.

The severity of HIV-related illness is directly related to the degree of dysfunction of the immune system. The onset of clinical illness, often several years after initial infection, is usually insidious with non-specific signs and symptoms such as lymphadenopathy, loss of appetite, diarrhea, weight loss, fever, fatigue and vaginal candidiasis. Over time, the immune system dysfunction associated with HIV infection worsens, making the individual increasingly vulnerable to certain serious opportunistic infections and cancers.

On January 1, 1993, the Centers for Disease Control and Prevention (CDC) expanded the AIDS case definition to include persons infected with HIV having laboratory evidence of severely impaired immune function (e.g., CD4+ cell counts under 200 and/or a CD4+ percentage of <14 %). Also, the new definition added pulmonary tuberculosis, recurrent pneumonia and invasive cervical cancer to the previous list of 23 AIDS-indicator diseases and conditions.

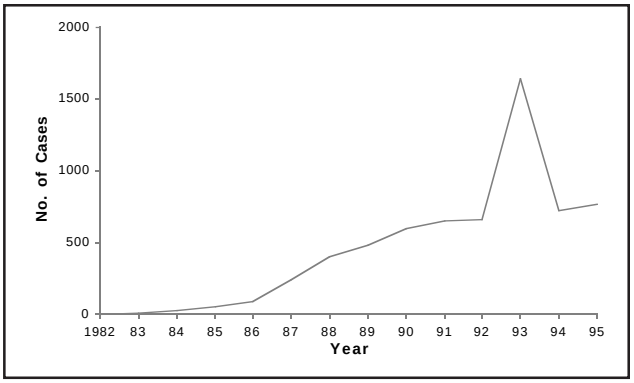


Figure 1. AIDS cases by year of report, Missouri, 1985–95

The 1993 expansion of the surveillance case definition had a significant impact on the number of AIDS cases reported in Missouri in calendar year 1993. Of the 1,644 AIDS cases reported in 1993, 1,024 (62.3%) were the direct result of the new case definition. During 1994, the number of reported cases decreased to 726; but then increased by 5.9 percent to 769 in 1995. See Figure 1.

Persons infected with HIV who do not meet the AIDS surveillance case definition are termed HIV cases; infected individuals who do meet the case definition are AIDS cases. Thus an HIV-infected person reported to the Department of Health is classified as either an HIV case or an AIDS case. An HIV case who subsequently meets the AIDS case definition is reclassified as an AIDS case. This makes it possible to more accurately depict the epidemic and better describe the continuum of HIV disease in the state. However, one cannot construct a useful epidemic curve (number of cases by year of report) for HIV cases. This is because, over time, individual HIV cases are removed as their disease process progresses and they become AIDS cases.

In 1995, 603 HIV cases and 769 AIDS cases were reported in Missouri residents. Since the beginning of the epidemic in the state, a total of 3,426 HIV cases and 6,341 AIDS cases have been reported.

In both 1994 and 1995, the largest numbers of AIDS and HIV cases occurred in the 20–29 and 30–39 year old age groups. See Figures 2 & 3. Cases occurred primarily in white males, with black males forming the second largest group. See Figures 4 & 5.

Males comprised 92.4 percent of the total number of AIDS cases reported in 1994, and nearly 88.9 percent of the total reported in 1995. The major exposure category for AIDS cases is men who have sex with men (MSM). MSM comprised 71.6 percent of AIDS cases reported in 1994, and 65.9 percent of those reported in 1995. See Figures 6 & 7. In 1994 and 1995, 57.2 percent and 52.9 percent of HIV cases, respectively, were in MSM. Heterosexual contact was the second most common risk behavior for HIV cases in 1995, being reported by 11.1 percent. Injecting drug use (IDU) was the other major exposure category for HIV cases.

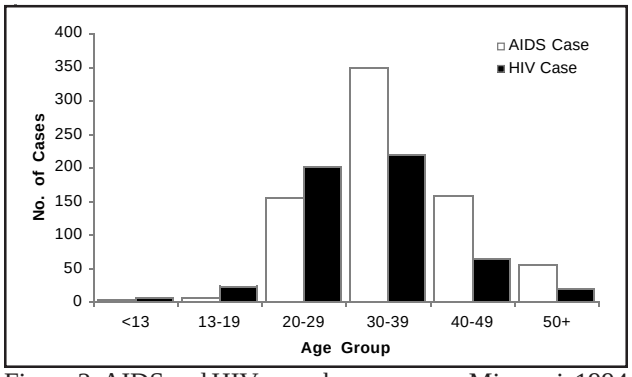


Figure 2. AIDS and HIV cases by age group, Missouri, 1994

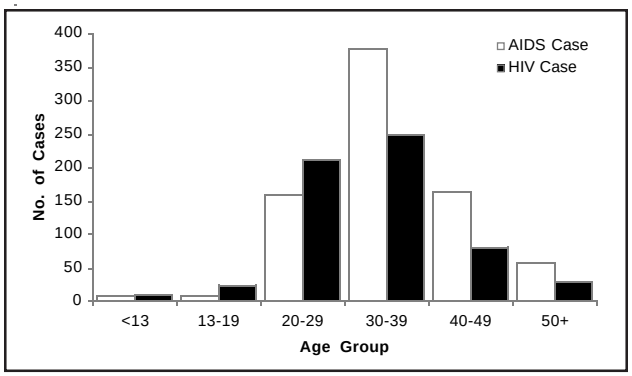


Figure 3. AIDS and HIV cases by age group, Missouri, 1995

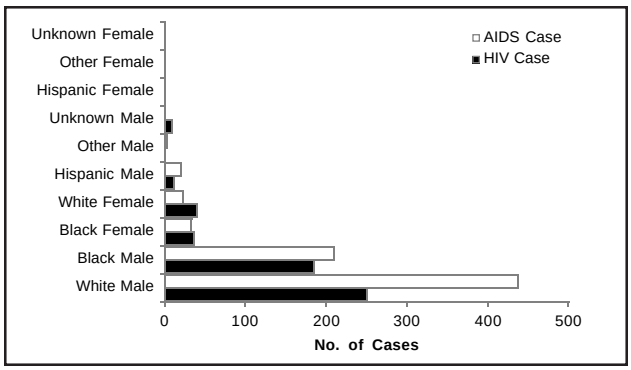


Figure 4. AIDS and HIV cases by race, Missouri, 1994

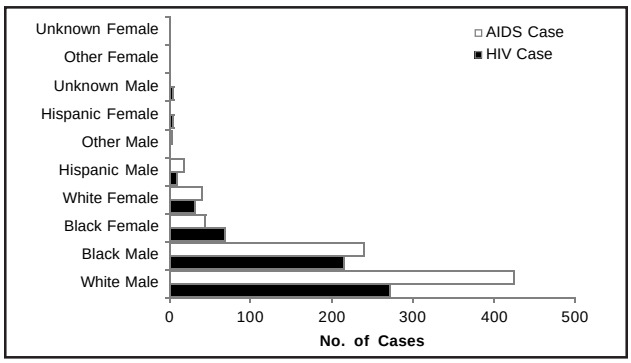


Figure 5. AIDS and HIV cases by race, Missouri, 1995

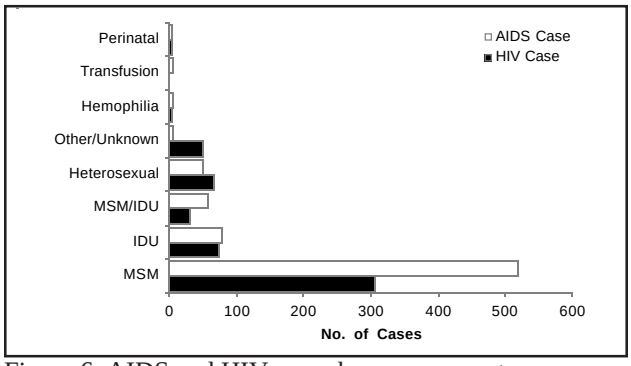


Figure 6. AIDS and HIV cases by exposure category, Missouri, 1994

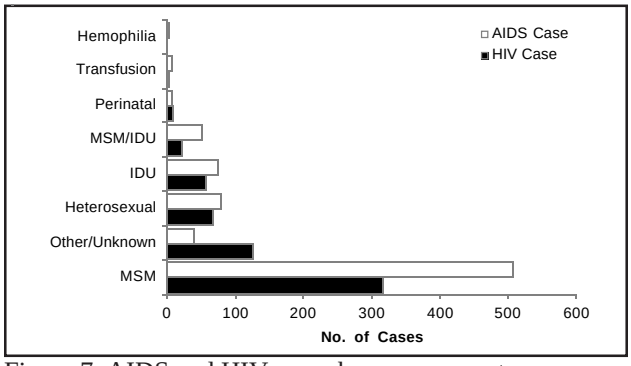


Figure 7. AIDS and HIV cases by exposure category, Missouri, 1995

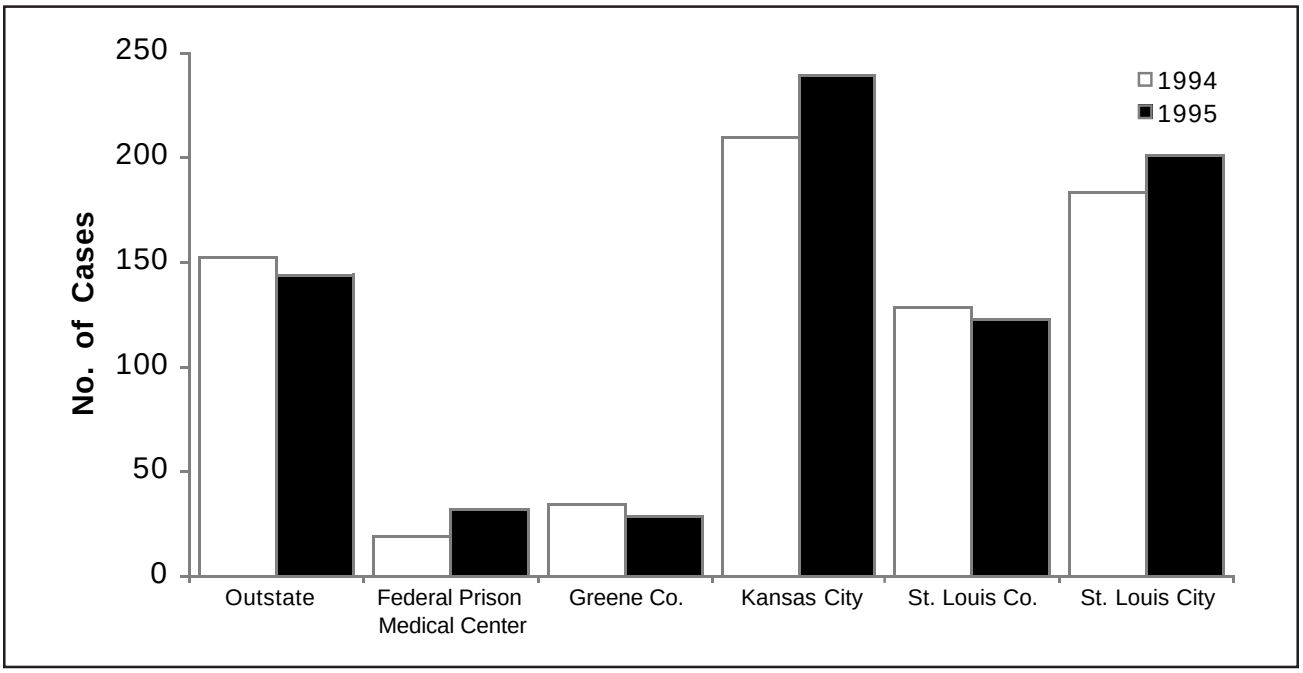


Figure 8. AIDS cases by geographic area, Missouri, 1994-95

The majority of reported HIV and AIDS cases in Missouri in 1994 and 1995 were from the major metropolitan areas of St. Louis and Kansas City. See Figure 8. Together, these two areas accounted for 73.4 percent of AIDS cases and 66.3 percent of HIV cases reported in 1994, and 76.3 percent of AIDS cases and 77.0 percent of HIV cases reported in 1995.

The geographic distribution of AIDS cases in Missouri is shown in Figure 9. As of December 31, 1995, AIDS cases have been reported in residents of 97 of the state's 115 counties. Of those 18 counties which have not reported AIDS cases, all are adjacent to at least one county which has had two or more cases among its residents. In addition, seven of the 18 counties with no reported AIDS cases have residents who have been reported as infected with HIV, but who have not progressed to AIDS. The AIDS epidemic has clearly been concentrated in the St. Louis and Kansas City metropolitan areas; 39.9 percent of all cumulative reported AIDS cases have been in residents of St. Louis City and St. Louis County, and 35.3 percent in residents of the Kansas City area.

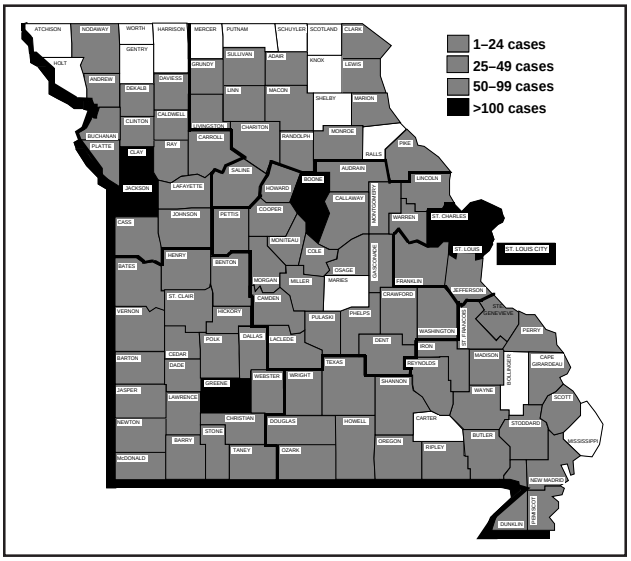


Figure 9. Cumulative AIDS cases by county of residence, Missouri, through December 31, 1995.

Non-gonococcal Urethritis (NGU)

While *Chlamydia* is the most frequently isolated organism in cases of non-gonococcal urethritis (NGU), there are a number of other agents which can also cause NGU. *Ureaplasma urealyticum* is considered to be the etiologic agent in 10–20 percent of chlamydia-negative cases of NGU.

In Missouri, reported cases of NGU decreased 6.0 percent from 6,425 cases in 1993 to 6,063 cases in 1994. In 1995, 7,550 cases were reported, an increase of 24.5 percent. See Figure 1.

NGU is no longer a reportable disease in Missouri as of April 30, 1996.

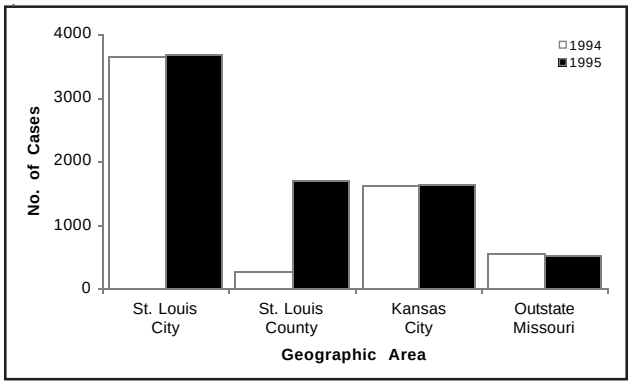


Figure 1. Non-gonococcal urethritis cases by geographic area, Missouri, 1994–95

Syphilis (Primary, Secondary and Early Latent under one year)

Syphilis is both an acute and chronic disease caused by a spirochetal organism, *Treponema pallidum.* The disease is characterized by a primary lesion, by a secondary eruption involving the skin and mucous membranes and by late lesions of the skin, bone and viscera. The primary lesion (chancre) usually appears about three weeks after infection as a painless ulcer with a serous exudate at the site of initial infection. After four to six weeks, the chancre begins to disappear and a generalized secondary infection may develop. CNS involvement and subsequent disease may occur at any of the stages of syphilis infection. Death or serious disability rarely occurs with the early stages of syphilis; late manifestations of the disease, however, tend to impair health, limit mobility and shorten life expectancy.

Syphilis is primarily transmitted during sexual contact through direct exposure to infectious exudates from lesions on the skin and mucous membranes.

Early syphilis includes primary, secondary and early latent cases reported within less than one year from the date of infection.

In Missouri, the reported incidence of early syphilis decreased by 21.0 percent from 2,144 cases in 1993 to 1,694 cases in 1994, and then further decreased by 35.7 percent to 1,090 cases in 1995. See Figure 1.

Primary and secondary (P & S) cases decreased 40.8 percent, from 987 cases in 1994 to 584 cases in 1995. Missouri's 1995 P & S syphilis rate of 11.0 per 100,000 was still higher than the national rate of 6.3 per 100,000.

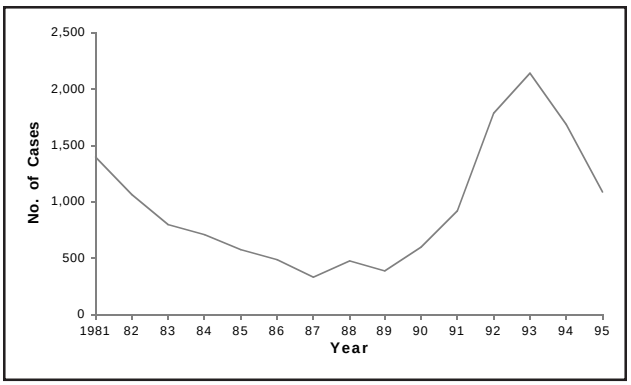


Figure 1. Early syphilis cases by year of report, Missouri, 1981–95

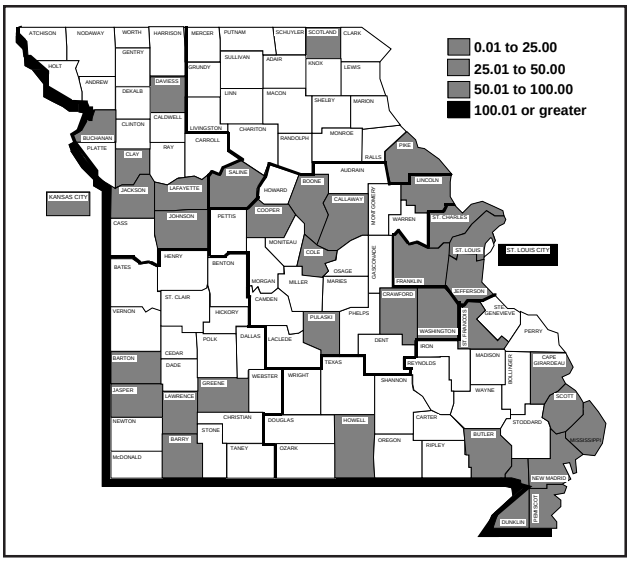


Figure 2. Early syphilis incidence per 100,000 population by county, Missouri, 1995

Early latent syphilis cases decreased 28.4 percent, from 707 cases in 1994 to 506 cases in 1995.

The major urban areas reported the majority of early syphilis during 1995. St. Louis City reported 361 (61.8%) of the state's 584 cases of P & S syphilis, and 289 (57.1%) of the 506 total cases of early latent syphilis. See Figure 2.

In 1995, St. Louis City had the highest P & S syphilis rate (100.6 per 100,000) among all cities of greater than 200,000 population in the United States. Kansas City, with 5.5 cases per 100,000, ranked 35th.

Congenital Syphilis

Congenital syphilis is a preventable disease. It causes significant fetal mortality, and can cause serious illness, long-term sequelae and occasional deaths in affected infants and children. Transmission of *T. pallidum* from mother to fetus can occur across the placenta during the prenatal period, and also at the time of delivery through contact with infectious secretions in the birth canal. Infection of the child is most likely during early maternal syphilis, with the probability of transmission being 70-100 percent during the first four years after the mother acquires her infection. Subsequently, the likelihood of transmission decreases, although it can occur throughout the latent period.

At least half of infected liveborn infants do not have clinical evidence of disease at the time of birth (and if the mother acquired her syphilis infection late in pregnancy, she may not show any signs of disease before the time of delivery). Infants who develop signs of early congenital syphilis usually do so within the first few months after birth. If the mother has untreated early syphilis, up to 40 percent of pregnancies will result in stillbirths or perinatal deaths.

Congenital infections may result in late manifestations such as Hutchinson's teeth, saddlenose, saber shins, interstitial keratitis and deafness.

Transmission can occur from a child with early congenital syphilis to those with whom he or she has direct contact. The moist secretions found in early congenital syphilis are highly contagious.

During the past two years, there has been a significant decrease in the number of reported cases of congenital syphilis in Missouri, paralleling the decrease that has occurred in cases of primary and secondary syphilis. The reported incidence of congenital syphilis decreased 36 percent from 72 cases in 1994 to 46 cases in 1995. See Figure 1. From 1989 to 1993, yearly increases occurred in

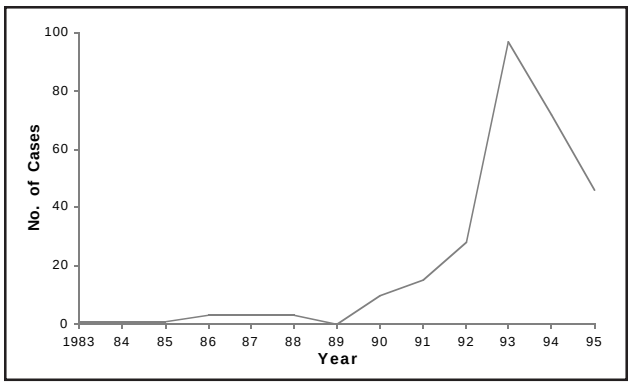


Figure 1. Congenital syphilis cases by year of report, Missouri, 1983–95

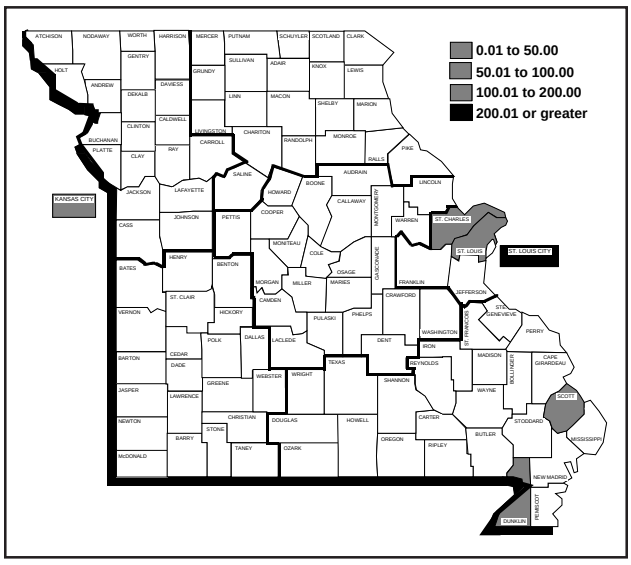


Figure 2. Congenital syphilis incidence per 100,000 live births by county, Missouri, 1995

the number of reported cases. These increases were partially due to a new, more sensitive surveillance case definition which has been utilized since July 1, 1990. However, a true increase in the number of infected infants was also occurring during this time. The decrease in reported cases during 1994 and 1995 reflects a true decrease in the occurrence of infection.

In Missouri, congenital syphilis cases have primarily been concentrated in the metropolitan areas of St. Louis and Kansas City. This corresponds to the concentration of primary and secondary syphilis cases in these same locations. Figure 2 shows the case rate by county in 1995. In Missouri, as else-

where, congenital syphilis cases have occurred most frequently in persons who live in lower socioeconomic neighborhoods.

An additional factor which appears related to the occurrence of congenital syphilis is the use of illicit drugs, especially crack cocaine. Crack use has been associated with high risk sexual behaviors, and with the acquisition of syphilis. It has also been associated with lack of prenatal care among pregnant female users. While precise data on the relationship between illicit drug use and syphilis infection in Missouri is not available, there is substantial anecdotal evidence obtained by public health investigators which indicates that drugs, and especially crack cocaine, do play a significant role in promoting the spread of the disease in the state.

Tuberculosis

Tuberculosis (TB) (*Mycobacterium tuberculosis*)

Tuberculosis is a bacterial disease whose symptoms can often be mistaken for those of other respiratory illnesses. It is transmitted primarily by airborne droplet nuclei that are produced when a person with infectious tuberculosis coughs or sneezes the organisms into the air. If another person inhales air containing droplet nuclei, then transmission may occur. Most commonly, the lungs are the organs involved, but approximately 15 percent of the cases are extrapulmonary. Extrapulmonary tuberculosis may occur in any tissue or organ of the body including the brain, kidneys, eyes, bones, joints and lymphatic system. Individuals with prolonged exposure or who are close contacts to an active case of tuberculosis are at greater risk of becoming infected. About five to ten percent of those infected will develop active disease at some time during their lifetime. Individuals who are HIV positive and infected with tuberculosis are at a much higher risk, seven to ten percent per year, of developing active tuberculosis disease.

Groups at greatest risk of acquiring tuberculosis disease or infection are individuals with HIV, residents of homeless shelters, nursing homes and correctional facilities as well as foreign-born individuals. Health care workers who serve high-risk clients also are at greater risk of acquiring tuberculosis.

In Missouri, there were 260 cases of tuberculosis reported in 1994 for a case rate of 5.0 per 100,000 population. This represents a 1.6 percent increase over 1993 when 256 cases were reported. In 1995, Missouri's tuberculosis cases reached an all time low with 244 cases reported for a case rate of 4.6 per 100,000. This represents a 5.8 percent decrease from 1994. See Figure 1.

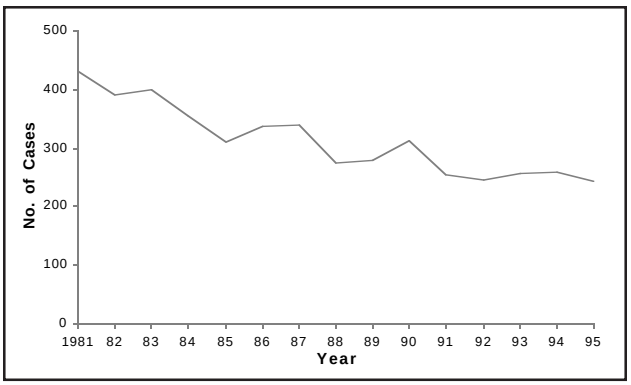


Figure 1. Tuberculosis cases by year, Missouri, 1981-95

The number of reported cases in Missouri in 1994 varied by geographical area, with the majority of cases reported from the large urban centers in the state, St. Louis City, St. Louis County, Kansas City and Springfield/Greene County. This represents a reversal of the previous trend when most of the cases were reported from the outstate area. In 1994, there were 41 cases reported from St. Louis City, a decrease from 43 the previous year; 42 cases from St. Louis County, an increase from 36 in 1993; 14 cases from Springfield/Greene County, an increase from nine; and 39 cases from Kansas City, an increase from 37 in 1993. Three of the four urban centers experienced increases between 5.4 and 55.6 percent. Springfield/Greene County experienced the greatest increase in 1994.

In 1995, decreases were noted in three of the four metropolitan areas. See Figure 2. St. Louis County dropped from 42 cases in 1994 to 35 in 1995, St. Louis City from 41 cases to 40 and Springfield/Greene County from 14 cases to 10. Kansas City experienced an increase from 39 cases in 1994 to 42 cases in 1995, the highest number of cases for any geographical area of the state, for a case rate of 9.7 per 100,000 population. This is more than twice the state rate of 4.6 and higher than the national rate of 8.7.

In 1994, two out of the six Department of Health districts experienced increases in the number of

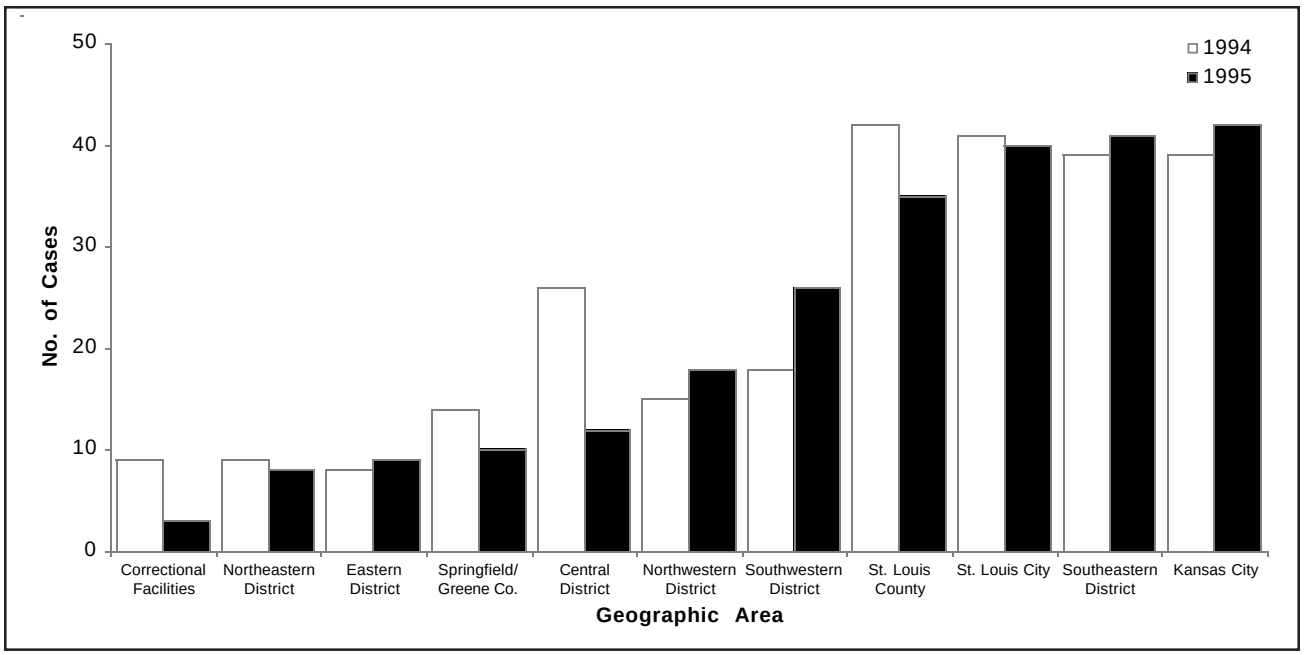


Figure 2. Tuberculosis cases by geographic area, Missouri, 1994 and 1995

tuberculosis cases reported. Three health districts reported declines and one remained the same as the previous year. Overall, a decline of 5.3 percent was noted for the outstate area. The Northeastern District experienced the greatest increase, from two cases in 1993 to nine in 1994, while the Southeastern District experienced an increase from 34 in 1993 to 39 in 1994. Tuberculosis cases in the Northwestern District remained the same at 15 cases, while the Southwestern District declined from 26 to 18, the Eastern District decreased from 17 to 8 and the Central District decreased from 29 in 1993 to 26 in 1994. Tuberculosis cases in correctional facilities or institutional settings increased by one over the previous year.

In 1995, the outstate area showed a 5.7 percent decrease in the number of cases from 124 in 1994 to 117 in 1995. Increases were noted in four of the six health districts. See Figure 2. The greatest decrease was noted in the Central District, which went from 26 cases in 1994 to 12 in 1995. Decreases were also noted in state and federal correctional facilities, which went from nine cases to three, and the Northeastern District.

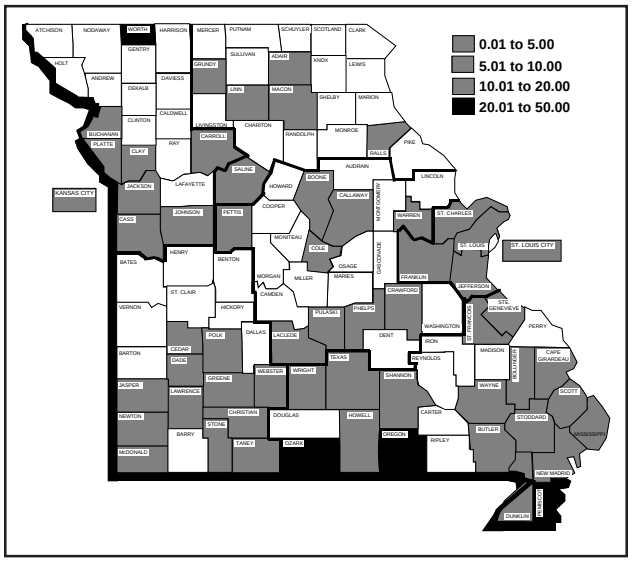


Figure 3. Tuberculosis case rates by county, Missouri, 1995

As shown in Figure 3, a large portion of counties with high tuberculosis case rates are located in the southern half of the state. In 1995, the case rates in 12 counties in the southern part of the state ranged between 10 and 50 per 100,000 population, compared to an overall case rate for the state of 4.6.

As in prior years, pulmonary cases accounted for the majority of cases reported. In 1994, 216 (85%)

were pulmonary cases and 44 (15%) were extrapulmonary cases. In 1995, 201 cases (82.4%) were pulmonary and 43 (17.6%) were extrapulmonary. The predominant sites for extrapulmonary disease were lymphatic, pleural and bone/joint.

In 1994, 160 (61.5%) of the cases were male and 100 (38.5%) were female. In 1995, 151 cases (61.9%) were male and 93 (38.1%) were female.

There continues to be a disproportionately higher incidence of tuberculosis among Missouri's minorities. In 1994, African Americans accounted for 67 (25.8%) of the cases, Asians/Pacific Islanders 25 (9.6%), Hispanics 8 (3.1%), Native Americans 1 (0.4%) and whites 159 (61.2%). When comparing case rates per 100,000 population, whites have the lowest case rate at 3.4 compared with Native Americans at 4.3, African Americans at 12.0, Hispanics at 12.6 and Asians at 61.8.

In 1995, African Americans accounted for 83 (34%) of the cases, Asians/Pacific Islanders 22 (9%), Hispanics 5 (2%) and whites 134 (55%). Asians had the highest case rate per 100,000 population at 41.3 compared with African Americans at 14.4, Hispanics at 7.2 and whites at 2.9. A significant drop in case rates was noted among Asians, from 61.8 in 1994 to 41.3 in 1995. Rates also declined among Hispanics, from 12.0 to 7.2, and whites, from 3.4 to 2.9. However, tuberculosis case rates increased in African Americans, from 12.0 to 14.4. See Figure 4.

The elderly continue to comprise the largest proportion of tuberculosis cases in Missouri. In 1994, 35.8 percent of the cases occurred among individuals age 65 and over. A decrease of 9.6 percent was noted in the under 25 age group. The 0–4 age group increased by one case, accounting for 4.2 percent of the total cases, while the 5–14 age group experienced a 3.6 percent decrease. The largest increase in 1994 occurred in the 25–44 age group with 33.3 percent.

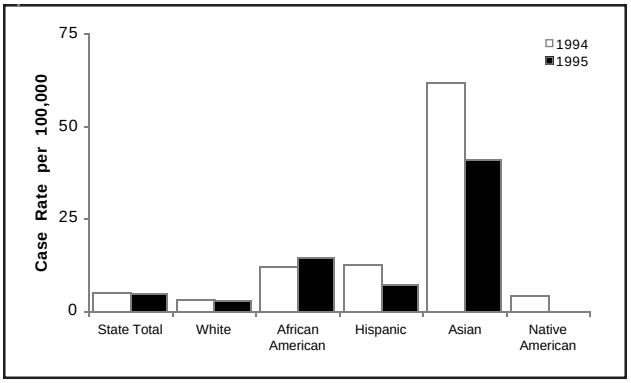


Figure 4. Tuberculosis case rates per 100,000 population by race and ethnicity, Missouri, 1994 and 1995

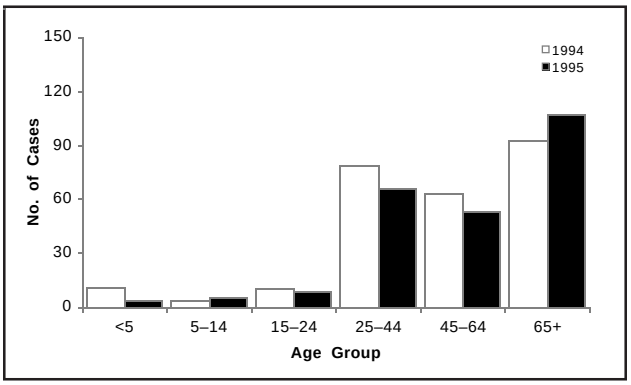


Figure 5. Tuberculosis cases by age group, Missouri, 1994 and 1995

In 1995, a decline was noted in all age groups except those 5–14, with an increase of one case, and those age 65 and over. A significant reduction was noted in tuberculosis cases under 5 years of age, which declined from 11 cases in 1994 to four cases in 1995. This represents the second year in a row that early childhood cases have dropped. Tuberculosis cases among the elderly, those age 65 and over, continue to increase with 107 cases (43.9% of the total) in 1995 compared with 93 (35.8%) in 1994. See Figure 5.

Tuberculosis case rates were also substantially higher in residents of long-term care facilities. During 1994, there were 19 (7.3%) cases of tuberculosis reported in long-term care facilities, 15 of which were in nursing homes. Based on approximately 57,000 persons living in Missouri's nursing homes, this represents a case rate of 33.3 per 100,000 population. In 1995, cases in nursing

homes and long-term care facilities accounted for 17 (7%) of all reported cases in Missouri. This represents a case rate of approximately 30 per 100,000 population which is over six times the state rate and over three times the national rate.

For the first time in five years, the number of tuberculosis cases in Missouri among the foreign-born declined from 30 (13.8%) in 1994 to 27 (11%) in 1995. However, case rates among foreign-born Asians are disproportionately higher than for other racial and ethnic groups. Approximately 22 out of 27 foreign-born cases occurred among Asians in 1995 for a case rate of 41.3 per 100,000 population. This is substantially lower than the case rate of 61.8 in 1994.

In 1995, 9.0 percent of cases were resistant to Isoniazid, 1.9 percent to Rifampin, 1.4 percent to Pyrazinamide, one patient was resistant to Ethambutol and 12.8 percent to Streptomycin. The increase in the resistance rate for Streptomycin was largely due to implementation of a change in laboratory procedures measuring Streptomycin resistance. The number of Isoniazid/Rifampin resistant strains remained unchanged at three. See Figure 6. In 1995, there were five patients with multi-drug resistant strains of tuberculosis resistant to three or four antituberculosis drugs. Two of these patients were from Kansas City and one each from St. Louis County, St. Charles County and Taney County.

The number of tuberculosis/HIV cases in Missouri during 1994 increased by one, with 22 cases reported. Over 75 percent were reported from the four large urban centers in the state, St. Louis City, St. Louis County, Kansas City and Springfield/ Greene County. Cases were evenly divided between whites and minorities. From 1990–94, cases increased from 7 to 22. However, this trend was reversed in 1995 when only 16 cases were identified as having dual disease. See Figure 7. For the first time since 1987, there were no cases with dual disease reported from either federal or state correctional facilities, nor were there any cases reported from the outstate area.

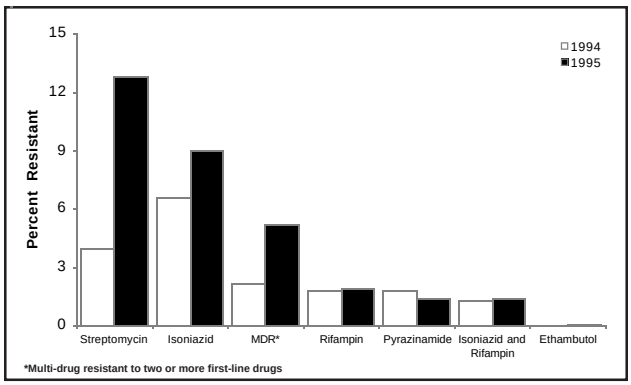


Figure 6. Percentage of resistance to anti-tuberculosis drugs, Missouri, 1994 and 1995

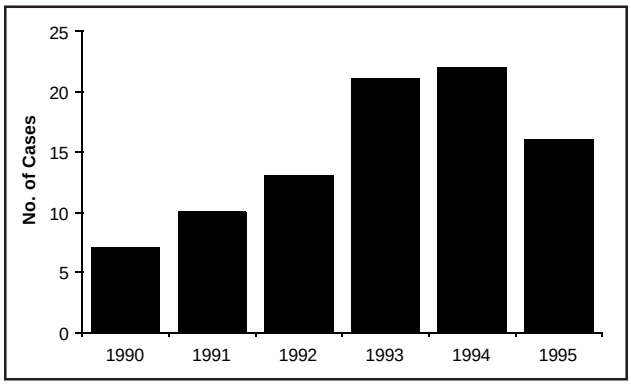


Figure 7. Tuberculosis/HIV cases by year, Missouri, 1990–1995

The screening of high-risk populations is beginning to show results, including screening in nursing homes, state correctional facilities and drug treatment centers; an incentives program to ensure completion of treatment; educational activities geared toward patients and health care providers, as well as the strong emphasis on directly observed therapy (DOT) and completion of therapy.

If this downward trend in tuberculosis morbidity continues over the next five years, Missouri will realize its interim goal of no more than 175 new tuberculosis cases by the year 2000 and will be well on its way to its ultimate goal of tuberculosis elimination by the year 2010.

Zoonotic Diseases

Animal Bites

One-half to one million animal bites occur in the United States each year. Dogs account for over 75 percent of the bites, cats 15 percent and wild carnivores and humans account for the remainder. One percent of all emergency room visits are due to animal bites. Classified as the most serious of pet-associated health hazards, based on frequency, severity and financial expenditures, animal bites are estimated to be at least 50 percent under reported.

Children are at the highest risk, with an age adjusted attack rate for the 5–14 years age group of 1,000 per 100,000. Others at high risk are occupational groups such as meter readers, animal control officers and delivery personnel. Approximately ten percent of all animal bites require suturing and one to two percent require hospitalization. The fatality rate for animal bites is not known, but it is estimated that there are about ten fatalities per year. Larger dog breeds are responsible for more severe bites. Owned dogs protecting their territory are more likely to bite than strays. Medical costs in the United States average about $75.00 per incident, and the total cost is estimated to be from $38–75 million per year.

The most common infection associated with bites is *Pasteurella multocida*. Other organisms involved are *Staphylococcus aureus*, aerobic streptococci and anaerobes such as *Peptococcus spp.*, *Bacteroides spp.* and *Fusobacterium spp.* Other specific organisms can be involved with wild animals and rodents.

Animal bites are no longer reportable to the Department of Health effective April 30, 1996. However, since Missouri is an endemic area for rabies, it is of utmost importance that all animal bites be reported to the local health departments and medical evaluation performed. Based on this evaluation, rabies post exposure treatment may be indicated. Failure by the public to report or seek medical attention after a bite altercation could result in human cases of rabies.

In 1994, there were 6,831 animal bites reported and in 1995, 6,851 were reported.

Arthropod-borne Viral Encephalitides

Encephalitis is an acute inflammatory process of the brain, spinal cord and meninges and is normally of short duration. Signs and symptoms are of central nervous system origin and include fever, severe headaches, stupor, disorientation, coma, spasticity, tremors and convulsions. Treatment is supportive in nature and post disease sequelae occur.

There are four arthropod-borne viral encephalitides of importance in the United States: Eastern equine (EEE), Western equine (WEE), St. Louis (SLE) and LaCrosse (LAC). All four are vectored by specific mosquitoes or group of mosquitoes between birds, equine or humans. Man is a dead end host, since transmission does not occur from humans to other humans or animals. Fatalities are highest with Eastern equine encephalitis.

All of these except EEE have occurred in Missouri. Incidence has been low during the past decade in Missouri and the United States. However, since sporadic cases continue to occur, it is evident that the virus is present in nature. A wetter ecology means more mosquitoes, and with virus amplification over a period of time, outbreaks of disease may occur. Outbreaks have occurred two to four years after major floods. The 1993 and 1995 flooding in Missouri may have increased the risk of mosquito-borne diseases for the next four to six years.

Methods of prevention involve a system of surveillance in the normal hosts of birds and equine and mosquito control to prevent spread and transmission to man. Prior to 1993, Missouri did not have its own system of surveillance in birds. It relied on surveillance systems in Illinois, Ohio and other neighboring states. Passive surveillance was conducted for equine and human cases of disease.

Due to the great flood of 1993, active surveillance systems were conducted in humans, horses and mosquitoes in Missouri in the summer of 1993. The Department of Health continued surveillance programs for SLE, WEE and LAC encephalitis during the 1994–95 mosquito season. The following surveillance systems were operational:

- Active surveillance for
  - -human cases of disease
  - -equine cases of disease
  - -virus activity in mosquitoes
  - -virus activity in wild birds
- Monitoring of sentinel chicken flocks for virus activity

Human arboviral surveillance activities consisted of standard weekly reporting by physicians and statewide weekly telephone contact with predesignated hospitals. Human sera were analyzed in 1994 and 1995; reports indicated that there were no human arboviral cases in Missouri in either year. Illinois had two cases of SLE in 1995.

Thirteen veterinarians throughout the state were contacted by telephone on a weekly basis. All reports indicated no arboviral activity in horses in Missouri in 1994 or 1995.

Five sentinel chicken flocks (ten chickens per flock) were placed in the following counties: Clay, Jefferson, Livingston, Marion and Vernon. All chickens were bled on a weekly basis from May–October by contract or local health personnel. No IgM antibodies specific for SLE or WEE were detected in chickens in 1994 or 1995. This indicated that arboviral activity was not occurring in those areas.

In 1994, active surveillance for arboviral activity in wild bird populations consisted of collection of 501 wild birds of 17 species from eight counties (Cape Girardeau, Clay, Cole, Jackson, Marion, Pettis, Ralls and St. Charles). The majority of birds

were English Sparrows (77.0%). Other species included Common Grackles (8.2%), Red-winged Blackbirds (5.2%) and European Starlings and Boat-tailed Grackles (2.6%). Sera from all birds tested negative for SLE, LAC and WEE virus induced IgM antibodies. This indicated that arboviral activity was not occurring in birds in those areas in 1994.

In 1995, a total of 1,042 wild birds of 15 species were collected from 15 counties (Andrew, Bollinger, Buchanan, Cape Girardeau, Clay, Clark, Cole, Jackson, Marion, Mercer, Putnam, St. Charles, Ste. Genevieve, St. Louis and Warren). The majority of birds were English Sparrows (91%). Other species included Common Grackles (3.4%) and European Starlings (2.0%). Sera from three birds in Marion county tested positive for SLE during the last week in September. This indicated arboviral activity in birds in Missouri in 1995.

Adult mosquito collections began in mid-May, 1995. Collection areas included the Mississippi River flood plain, the western area of the Missouri River flood plain, and southwest Missouri, primarily the Springfield area. Vector mosquito populations were considerably higher in 1995 than in 1994. By August 1, 1995, the number of vector mosquitoes collected was almost double the number collected during the same time period in 1994. Two periods of hot dry weather at the end of July and mid-August 1995 decimated the vector mosquito population. This was followed by early cool temperatures which prevented a resurgence of vector mosquito populations.

In 1994, there were 3,789 pools of adult mosquitoes tested for WEE and SLE, 729 pools tested for LAC and 337 pools tested for EEE by antigen capture ELISA. In 1995, there were 4,064 pools of adult mosquitoes tested for WEE, SLE and LAC. Pools included 94,685 specimens in 1994 and 91,843 specimens in 1995 of *Culex pipiens*, *Culex restuans*, *Culex salinarius*, *Culex tarsalis*, *Aedes triseriatus* and *Aedes albopictus*. All tests were negative, indicating that arboviral activity was not occurring or could not be detected in mosquitoes in those areas in 1994 or 1995.

Brucellosis

Brucellosis is a bacterial disease of humans, cattle, swine and dogs in the United States. The disease is characterized by an acute or insidious onset in humans with intermittent fever, headache, malaise, weakness, arthralgia and generalized flu-like symptoms that persist for an extended time period.

Historically, the disease was passed to humans from cattle via unpasteurized milk. With the advent of pasteurization of milk and the control and eradication of the disease in cattle, human brucellosis from cattle, with the exception of occupational exposure, has become a rarity. Canine brucellosis however, is emerging as a new zoonotic disease challenge. The dog breeding industry is initiating its own voluntary control and prevention programs. Since dogs have intimate social household contact with humans, transmission of this organism to humans may increase.

In 1994 and 1995, Missouri had no reported cases of human brucellosis. See Figure 1. The State Public Health Laboratory discontinued serologic testing for brucellosis as of June 30, 1988. Commercial laboratories use a variety of tests which makes diagnosis in humans difficult and may contribute to the low level of reporting.

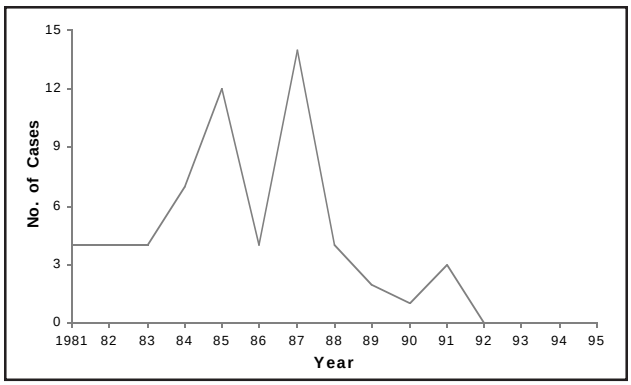


Figure 1. Brucellosis cases by year, Missouri, 1981–95

Ehrlichiosis

Erhlichiosis is an acute febrile illness of humans, thought to be transmitted by the brown dog tick, *Rhincephalus sanguineus*. As with other tick-borne diseases, it has an acute onset with flu-like symptoms including headache, myalgia, anorexia, nausea and in some instances a rash. Clinical laboratory abnormalities include leukopenia, thrombocytopenia and elevated levels of hepatic aminotransferase. The causative organism, *Ehrlichia chaffeensis*, was isolated in 1991 in Arkansas.

Missouri has had a total of 114 cases since 1988, for an average of 14 cases per year. This represents a higher level than has been reported from any other state. There were 15 cases reported in 1994 and 11 cases reported in 1995. See Figure 1.

Figure 2 shows ehrlichiosis cases by county for 1995.

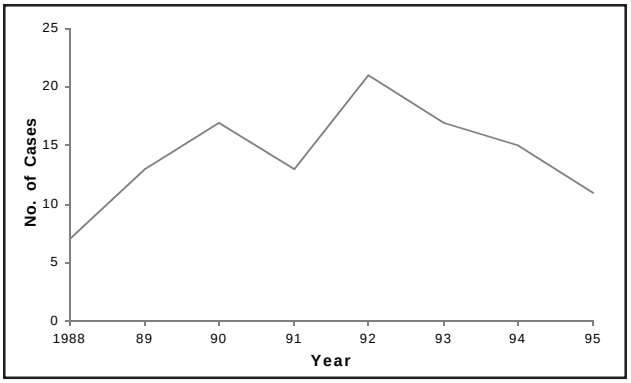


Figure 1. Ehrlichiosis cases by year, Missouri, 1988–95

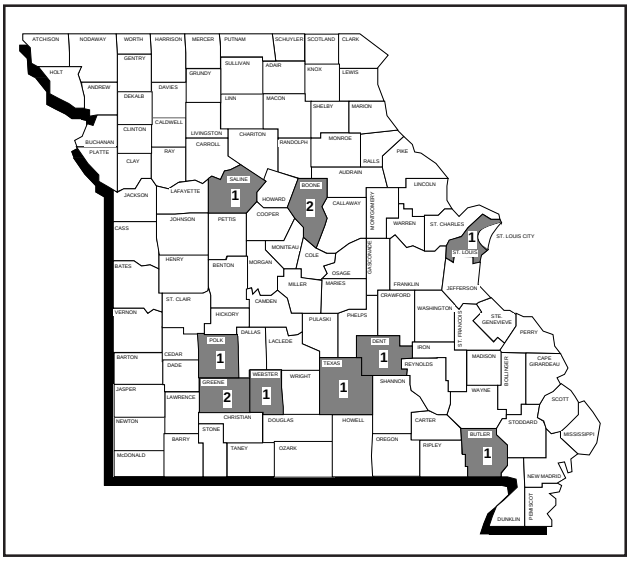


Figure 2. Ehrlichiosis cases by county, Missouri, 1995

Histoplasmosis

Histoplasmosis presents as a granulomatous disease of the lungs with varying degrees of severity. Normally children are infected while playing in dirt that contains histoplasma spore forms known as conidia; infection results from inhalation of airborne conidia. The disease usually causes sniffles for a few days, with the child not complaining of any illness. The healthy child wards off the disease and the infection is not recognized until later in life when chest x-rays show walled off, old lesions of histoplasmosis.

Single point source outbreaks do occur when an area high in histoplasma spores is excavated and the airborne spores expose susceptible individuals. Casual contact with spore laden soil can cause disease in immunosuppressed individuals.

Histoplasmosis is an endemic mycotic disease in Missouri and the Missouri and Mississippi River Valley Regions. Field studies have shown up to 85 percent of rural Missourians skin test positive for histoplasmosis.

Historically, Missouri has averaged about 185 new cases of histoplasmosis per year. However, reported incidence dropped dramatically when the State Public Health Laboratory ceased providing diagnostic testing as of June 30, 1988. There were 9 cases reported in 1994 and 4 cases reported in 1995. See Figure1.

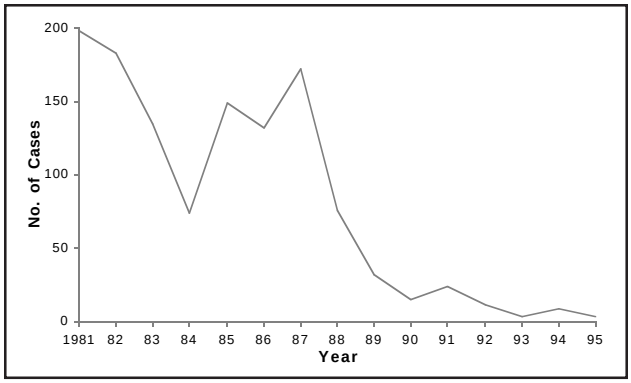


Figure 1. Histoplasmosis cases by year, Missouri, 1981–95

Leptospirosis

Leptospirosis is a bacterial infection of man and animals that is prevalent throughout the world. The disease manifests itself with a sudden onset, fever which maybe diphasic, headache, severe myalgia, conjunctival suffusion, rash with hemorrhage into the skin and mucous membranes, jaundice, renal involvement and meningitis resulting in mental confusion or depression. Illness can last from weeks to months. The organism is eliminated from the host via the kidney in the urine. Transmission in nature is by skin contact with urine contaminated water, soil or vegetation.

Prevalence of leptospirosis in animals in Missouri is high, causing sufficient disease and economic loss to justify the annual vaccination of cattle and canine. This, coupled with wild animal infection and transmission creates the risk of leptospirosis in man. For various reasons, the disease is under diagnosed and under reported in humans in Missouri. In 1994, there was one case reported and in 1995 two cases were reported. See Figure 1.

Figure 2 shows location of leptospirosis cases from 1984–95.

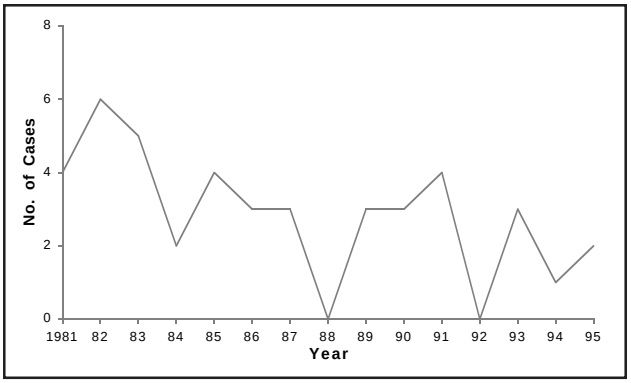


Figure 1. Leptospirosis cases by year, Missouri, 1981–95

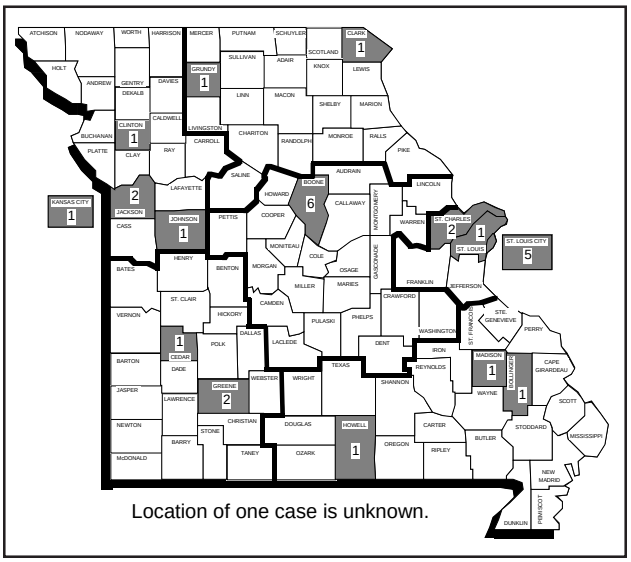


Figure 2. Leptospirosis cases by county, Missouri, 1984–95

Lyme Disease

Lyme disease, caused by the spirochete, *Borrelia burgdorferi*, was found in Old Lyme, Connecticut in 1975 to be transmitted by the *Ixodes scapularis* tick (formerly known in the east as *Ixodes dammini*). Subsequently, it has been found in other areas of the United States including the west coast, where it is transmitted by *Ixodes pacificus*. The illness often begins within 30 days of the tick bite with a characteristic skin lesion called erythema migrans (EM) which may be accompanied by generally mild systemic symptoms. Late arthritic, cardiac or neurologic manifestations may develop weeks after the initial tick exposure. The occurrence of Lyme disease in Missouri has been an enigma because the characteristic vector rarely bites humans in Missouri and the spirochete has been found only in rabbit ticks, *Ixodes dentatus*, which rarely bite humans. There have been numerous discoveries of spirochetes reacting with antibody tests in *Amblyomma* and *Dermacentor* ticks in Missouri, but all efforts to date to culture the bacteria from these ticks and humans have failed.

The number of reported Lyme disease cases increased dramatically after it was designated a reportable disease in Missouri in June 1989, but reporting has declined since 1991, perhaps due to the controversy surrounding Lyme disease in Missouri. See Figure 1. It is still the most commonly reported tickborne illness in Missouri. There were 102 cases reported in 1994 and 53 reported in 1995 which met the case criteria set by the Centers for Disease Control and Prevention and the Council of State and Territorial Epidemiologists.

The highest incidence in 1994 occurred in the 65–74 year age group (4.8 per 100,000), and the second highest rate was in the 45–54 year age group. In 1995, the 45–54 year age group had the highest rate (1.9 per 100,000). See Figure 2.

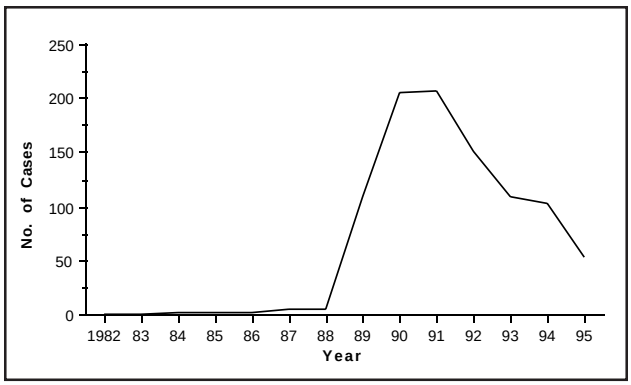


Figure 1. Lyme disease cases by year, Missouri, 1982–95

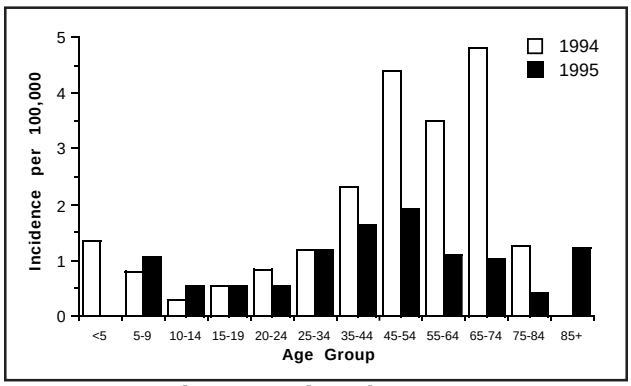


Figure 2. Lyme disease incidence by age group, Missouri, 1994–95

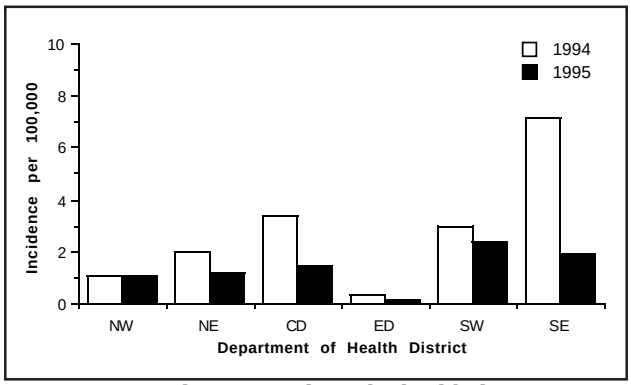


Figure 3. Lyme disease incidence by health district, Missouri, 1994–95

The highest incidence rate occurred in the Southeastern health district in 1994 (7.2 per 100,000). In 1995, the highest rate occurred in the Southwestern health district (2.4 per 100,000). See Figure 3.

Figure 4 shows the incidence rates by county in 1995. Among the cases reported, 5 (4.9%) were hospitalized in 1994 and 5 (9.4%) were hospitalized in 1995. No deaths were reported for 1994 or 1995. Cases seem to be associated with adults and rural areas.

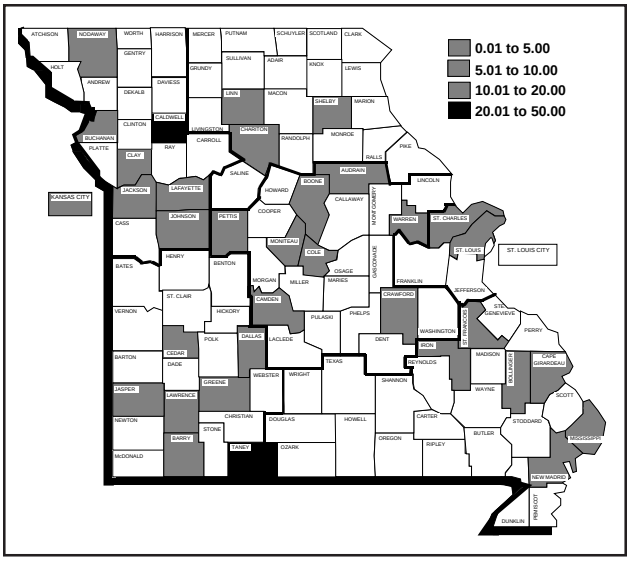


Figure 4. Lyme disease incidence per 100,000 by county, Missouri, 1995

Psittacosis

Psittacosis is a chlamydial disease of birds and man resulting in respiratory tract manifestation. The disease is characterized by flu-like symptoms of fever, headache and myalgia which can progress to pneumonia. Transmission is by direct contact and inhalation of the organisms from an infected host.

With the increased popularity of birds as companion animals and the poor quarantine measures for psittacine birds entering the United States, the incidence of psittacosis is increasing. That increase is not evident in Missouri.

Missouri experienced an epizootic of psittacosis in aviaries in 1988. Prompt action limited the infection to birds, avoiding human cases of disease. Four cases of psittacosis were reported in 1994 and no cases in 1995. See Figure 1.

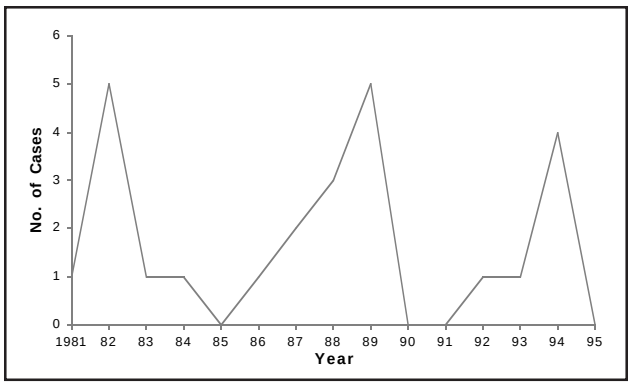


Figure 1. Psittacosis cases by year, Missouri, 1981–95

Rabies

Rabies is a fatal viral disease due to a rhabdovirus of the genus *Lyssa-virus*. It is a neurogenic virus which results in acute encephalomyelitis in all warm-blooded mammal species. The onset is usually benign in nature with a sense of anxiety, headache, fever, malaise and sensory changes at the site of a previous animal bite. The disease progresses rapidly to paresis, paralysis and/or muscle spasms. Death is due to respiratory paralysis. Missouri had its last human rabies case in 1952.

An estimated 50,000 cases of human rabies occur annually in the world, mostly in developing nations. The United States has had one to two human rabies cases a year for the past decade, with a number of these resulting from exposure outside the continental United States. See Figure 1. The decreased number of human rabies cases in the developed nations of the world is attributed to the control of stray animals and the mandatory vaccination of dogs and cats to serve as a buffer zone between the wildlife reservoir of rabies and the human populace. All animal bites are evaluated for possible rabies exposure and an estimated 50,000 post-exposure rabies treatments are administered annually in the United States. A passive surveillance system is utilized to detect the prevalence of rabies in the animal populations.

Missouri continues to experience a low prevalence of rabies activity, with only 27 cases of animal rabies reported in 1994 and 30 cases reported in 1995. Missouri has two reservoirs for rabies: the skunk, which is affected with two different strains, and the bat. Since 1990, Missouri has averaged only 31 reported rabies cases per year. See Figure 2. Rabies is endemic in the entire state. Over the past decade, rabies has occurred in 93 of 115 Missouri counties.

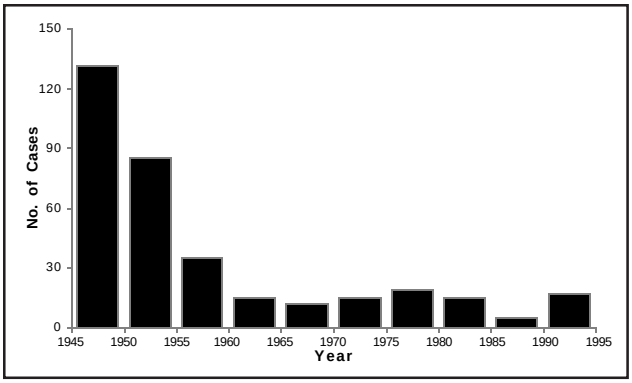


Figure 1. Human rabies cases by five-year intervals, United States, 1945–95

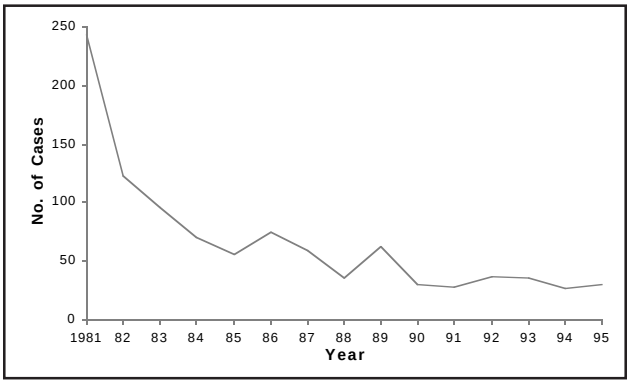


Figure 2. Positive animal rabies specimens by year, Missouri, 1981–95

The most important reason for the declining incidence of animal rabies is the decrease in the skunk population, the primary reservoir of rabies in Missouri. This has reduced the interaction and consequent spread of the disease. The low incidence of skunk rabies has also decreased rabies in other animals normally exposed to this reservoir.

The Department of Health has a model rabies and animal control document that all individual counties have the authority to implement. The document is comprehensive and covers all aspects of observation periods, proper vaccination of dogs and cats, general animal control and dangerous animal control.

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever (RMSF) is a rickettsial disease transmitted to man via the tick, *Dermacentor variabilis*, which is the reservoir for RMSF. Onset of the disease occurs 3–14 days after the infected tick has had a blood meal (engorged tick) on the susceptible individual. The organism is maintained in the midgut of the tick and is passed into the individual during the feeding process. It is also passed in tick fecal material and individuals can be infected by brushing the organism into abraded skin. Person to person transmission does not occur.

The disease is characterized by flu-like symptoms of fever, headache, malaise, myalgia and usually a maculopapular rash which appears on the palms and soles. The disease should be diagnosed by clinical signs and with either the CF or IFA test. The mortality rate in the United States can be as high as 15–20 percent in untreated cases, with four percent mortality.

During the last 15 years (1981–95), a total of 381 cases of Rocky Mountain spotted fever have been reported in Missouri, or an average of 25 cases per year. See Figure 1. In 1994, 22 cases were reported and in 1995, 30 cases were reported.

Figure 2 shows Rocky Mountain spotted fever cases by county for 1995.

From 1988–95, Missouri has had five deaths due to Rocky Mountain spotted fever, a case fatality rate of 19.3 per 1,000.

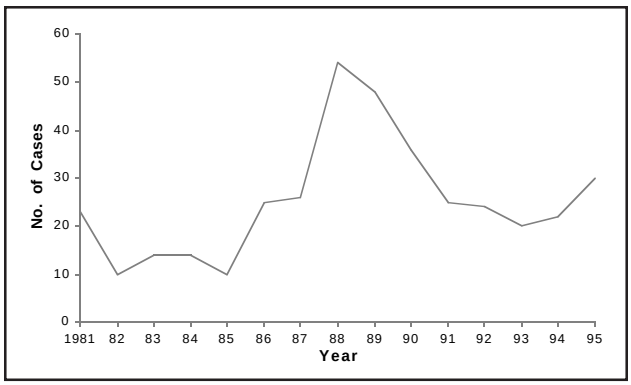


Figure 1. Rocky Mountain spotted fever cases by year, Missouri, 1981–95

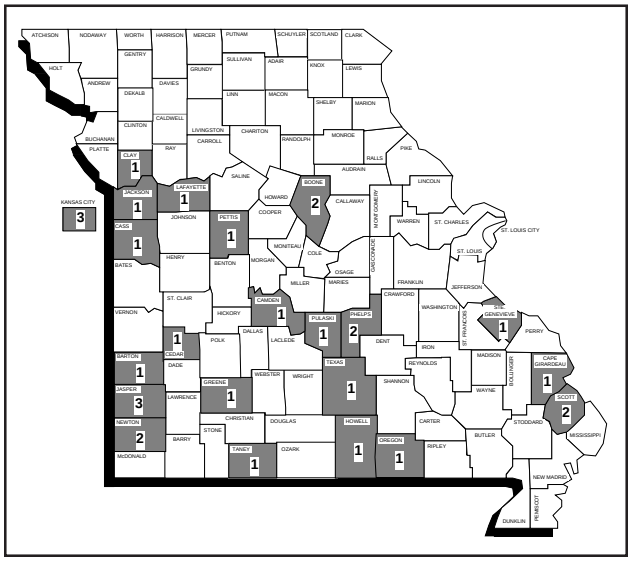


Figure 2. Rocky Mountain spotted fever cases by county, Missouri, 1995

Tularemia

Tularemia is a bacterial disease of wildlife and man. Wild rabbits are the primary reservoir. It is transmitted to man primarily through the blood meal of an infected tick or by direct contact with the organism while skinning or cleaning an infected wild rabbit. Infection can occur from contact with the organism either in contaminated water or meat or from the mouth of an animal which has just consumed infected meat. The disease manifests itself with an indolent ulcer at the site of inoculation and regionally enlarged, painful lymph nodes. Other routes of infection produce specifically related signs and symptoms. The disease can progress to systemic and pulmonary manifestation with a case fatality rate of five to ten percent.

Missouri and the Ozark Plateau are endemic for tularemia. Missouri and Arkansas usually lead the nation in total number of cases reported. During the last 15 years (1981–95), a total of 532 cases of tularemia have been reported in Missouri, or an average of 35 cases per year.See Figure 1. In 1994, 24 cases were reported and in 1995, 25 cases were reported. The percentage of people who contract the disease from exposure to ticks or rabbits is about equal. The disease occurs more often in males than females, probably due to differences in exposure.

Figure 2 shows tularemia cases by county for 1995.

In 1995, Missouri had three deaths due to tularemia. There were no deaths reported in 1994.

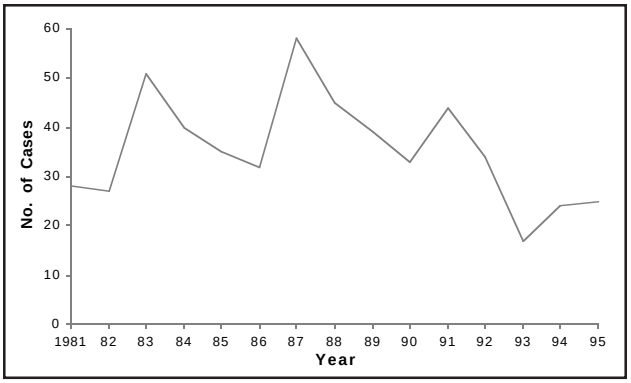


Figure 1. Tularemia cases by year, Missouri, 1981–95

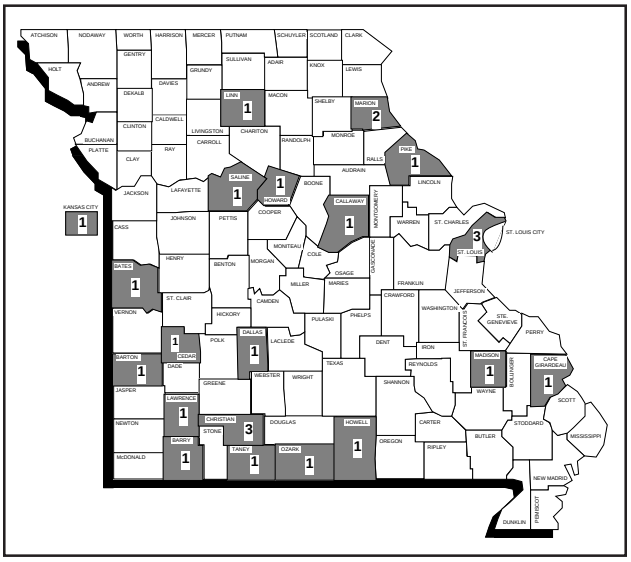


Figure 2. Tularemia cases by county, Missouri, 1995

Other Reportable Diseases

Disease	1994	1995
Chickenpox	10,147	8,840
Fifth Disease*	2,080	395
Pediculosis	9,961	16,687
Scabies	1,707	1,785
Scarlet Fever	755	598

*Erythema infectiosum or human parvovirus infection

Source: Data from active and passive surveillance systems

Diseases of Low Incidence

Disease	1994	1995
Amebiasis	38	18
Kawasaki Disease	12	19
Legionellosis	41	19
Listeria monocytogenes	17	21
Malaria	14	9
Tetanus	1	3
Toxic Shock Syndrome	7	14
Trichinosis	1	0
Typhoid Fever	1	3

There were no reported cases of anthrax, botulism, cholera, plague or Reye syndrome during these two years.

Environmental and Occupational Diseases and Conditions

Carbon Monoxide Poisoning

Carbon monoxide (CO) is a colorless, odorless gas given off by automobiles, furnaces, charcoal grills, kerosene heaters and other sources that create heat through combustion.

Carbon monoxide is rapidly absorbed through the lungs, and the rate of absorption is directly related to the alveolar ventilation. Once absorbed, it attaches to hemoglobin at the oxygen-binding sites with an affinity 250 times greater than that of oxygen, thereby reducing the oxygen-carrying capacity of the body. Combined, these actions result in varying degrees of hypoxia which can adversely affect the brain, heart and other body organs.

Carbon monoxide poisoning became a reportable condition in Missouri in April, 1993. Carboxy-hemoglobin levels above 15 percent are reportable. Only 22 cases were reported in 1994, and of these, only 15 were confirmed by laboratory testing. In 1995, 47 cases were reported, with 46 being laboratory confirmed. This increase is most likely due to increased awareness of the need to report cases of carbon monoxide poisoning to the Department of Health.

Carbon monoxide poisoning occurs throughout the year, but the risk increases in winter months with the use of gas or kerosene heaters (especially space heaters). In 1994, the date of onset was known for 15 cases. Of these, 12 (80%) occurred during the winter months of January, February, November and December. In 1995, 56 percent of the cases reported (for which date of onset was known) occurred during the same time period. See Figure 1.

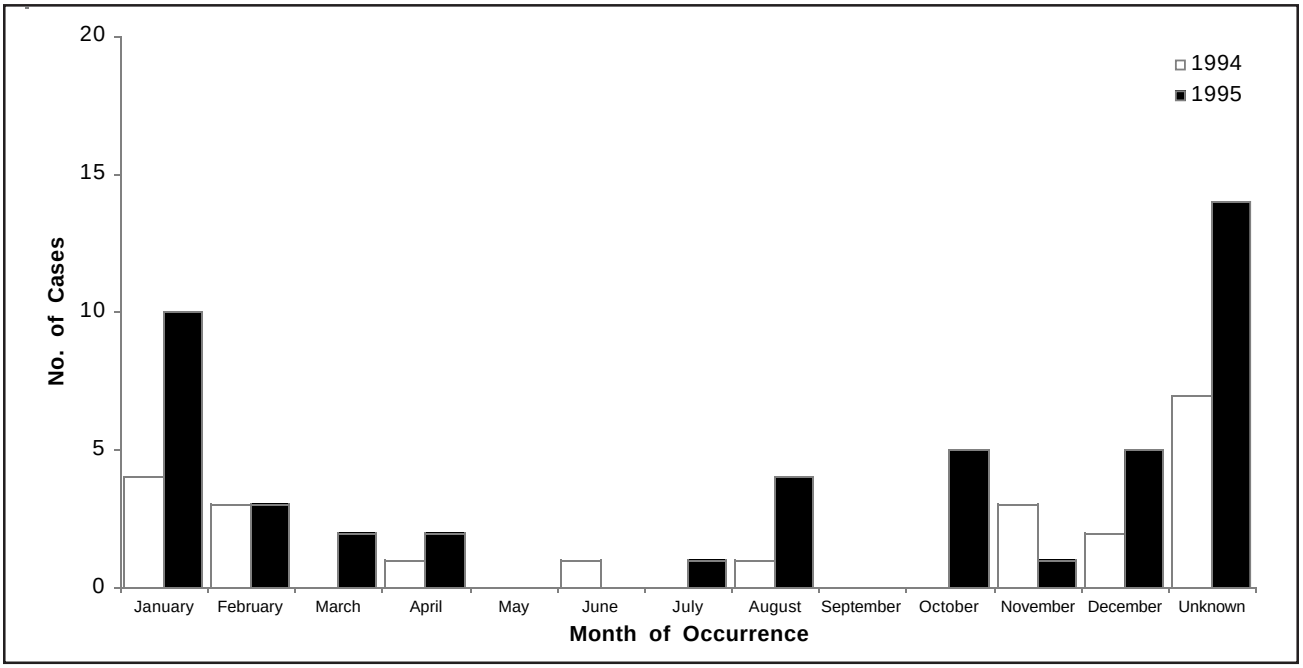


Figure 1. Carbon monoxide cases by month of occurrence, Missouri, 1994 and 1995

Hazardous Substances Emergency Events

The Missouri Hazardous Substances Emergency Events Surveillance (HSEES) system tracks and monitors non-petroleum hazardous substances emergency events (spills, releases, accidents or threats of these) that occur in Missouri. The HSEES program collects data on injuries associated with emergency events, as well as information about the event and the number of people potentially at risk in the area surrounding the event. Missouri is one of 14 states with a HSEES program. The program is funded by the Agency for Toxic Substances and Disease Registry (ATSDR) and began collecting data in Missouri on October 1, 1993.

In 1994, 208 of the hazardous substances emergency events reported to the HSEES program met the case definition. Seventeen (8%) events resulted in 36 injuries and one death. Six events involved one injury, four events involved two injuries, six events involved three injuries and one event involved five injuries. Employees were the largest group injured. Twenty-two employees were injured and one died. Ten (27%) responders were injured and four (11%) members of the general public were injured. See Figure 1. Thirty-three (89%) of the injured were male and four were female.

The most common type of injury reported in 1994 was respiratory irritation, which occurred in 20 (54%) of the victims. Other types of injuries/ symptoms reported were eye irritation, chemical burns, skin irritation, dizziness and other. See Figure 2. Of the 37 victims, the majority were transported to a hospital for treatment but not admitted. Figure 3 shows the breakdown of injuries by severity.

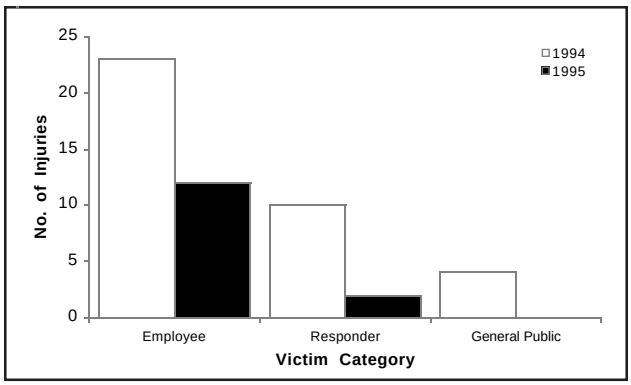


Figure 1. Number of injuries reported by type of victim category, HSEES, Missouri, 1994 and 1995

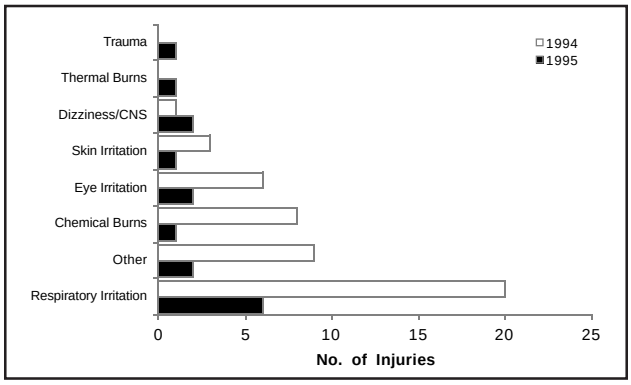


Figure 2. Number of injuries reported by type of injury, HSEES, Missouri, 1994 and 1995

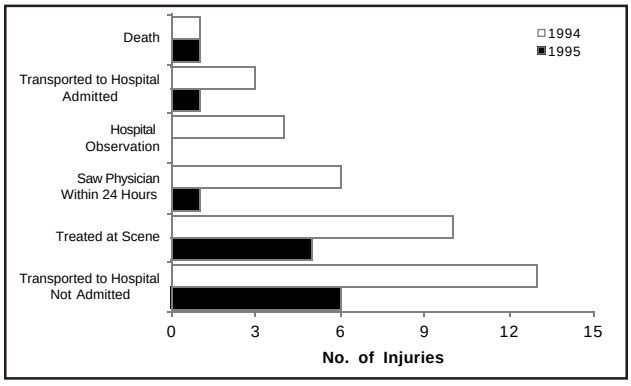


Figure 3. Number of injuries reported by severity, HSEES, Missouri, 1994 and 1995

In 1994, 18 substances were released in the 17 events where injuries occurred. The greatest number of injuries occurred in events involving ammonia (5/28%) and chlorine (2/11%). Other substances involved were acetic acid, acetone, hypochlorite solution, lead, nitrogen, phenol solution, potassium hydroxide, sodium hypochlorite, sulfuric acid, zinc ash and raw powder tear gas.

In 1995, 329 of the hazardous substances emergency events reported met the case definition. Ten (3%) of these events resulted in 13 injuries and one death. Six events involved one injury and four events involved two injuries. Twelve (86%) of those injured were male, one was female and the sex of one victim is unknown. Employees were the largest group injured in 1995. Eleven employees were injured and one died. Two responders, a firefighter and a police officer, were also injured. No members of the general public were injured in 1995. See Figure 1.

The most common type of injury reported in 1995 was respiratory irritation, which occurred in six (43%) of the 14 victims. Other types of injuries/ symptoms reported were eye irritation, skin irritation, trauma, chemical burns, thermal burns, dizziness/CNS and other. See Figure 2. Of the 14 victims, most were transported to a hospital but not admitted. Figure 3 shows the breakdown of injuries by severity.

In 1995, 13 substances were released in the ten events where injuries occurred. The greatest number of injuries occurred in events involving ammonia (2/15%) and sodium hydroxide (2/15%). Other substances involved were 1,3,5 trioxane, asbestos, ethylenediaminetetracet, hydrogen sulfide, hypochlorite solution, phosphoric acid, terbufos, cleaning compound and wood preserver.

Heavy Metal Poisoning

Heavy metal poisoning became a reportable condition in Missouri in April 1993. Other than lead, reports have been received on cases of mercury, arsenic, cadmium and selenium poisonings. See Figure 1. These cases were reported primarily by laboratories.

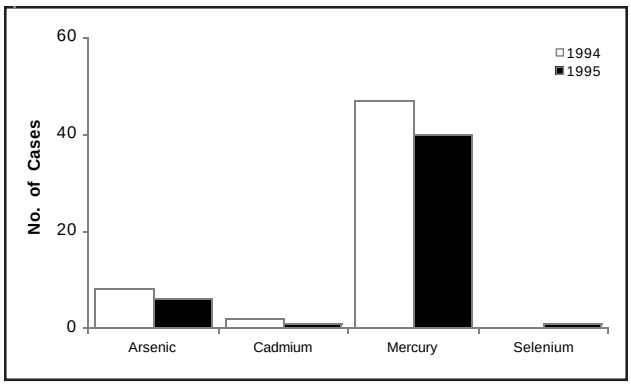


Figure 1. Number of heavy metal poisoning cases reported, Missouri, 1994 and 1995

Mercury poisoning can affect the nervous system. Effects include personality changes (irritability, shyness, nervousness), tremors, changes in vision or hearing and difficulties with memory. In addition, mercury poisoning can cause damage to the kidney and developing fetus.

Arsenic poisoning can cause irritation of the stomach and intestines, skin changes and impaired nerve function. Inhaled inorganic arsenic increases the risk of lung cancer. Large doses of inorganic arsenic (above 60,000 parts per billion in food or water) can cause death.

Exposure to higher levels of cadmium can cause proteinuria (elevated protein in urine). In addition, effects of inhaled cadmium range from lung irritation to cancer.

Selenium exposure can produce symptoms of dizziness, fatigue and irritation of mucous membranes. In extreme cases, pulmonary edema and severe bronchitis have been reported. The Environmental Protection Agency has determined that one form of selenium, selenium sulfide, is a probable human carcinogen. Selenium sulfide is the only selenium compound shown to cause cancer in animals.

Lead Poisoning

Lead is a neurotoxin. Lead poisoning may result in decreased intelligence, impaired neurobehavioral development and cognitive function, decreased growth, and visual and hearing deficits. It may also result in adverse effects on the central nervous, renal (kidneys) and hematopoietic (blood-producing) systems. Very high levels or prolonged exposure result in coma, convulsions and death. However, most lead poisoned individuals have no warning signs or symptoms.

Lead enters the body through inhalation and ingestion. Sources of lead exposure include industrial or occupational settings, such as lead smelting, plumbing and automotive repair; hobbies, such as ceramics, stained glass-making and casting ammunition and fishing weights; soil and dust with high lead levels from paint, leaded gasoline emissions and industry; drinking water contaminated by lead pipes or lead-soldered joints; and folk medicines.

Elevated blood lead levels ($\geq$10 µg/dL [ten micrograms of lead per deciliter of whole blood] in persons under age 18 or $\geq$25 µg/dL in persons age 18 or older) became a reportable condition in Missouri effective April 1993. Data on lead exposure has been collected since that time. The number of tests performed has increased due, in part, to the 1993 Department of Health and Human Services, Health Care Financing Administration mandate that Medicaid Healthy Children and Youth exams include a screening to assess a child's risk for lead poisoning. Increased testing can also be attributed to more widespread knowledge of citizens and health care providers of the harmful effects of lead and to collaborative efforts with the St. Louis City and St. Louis County health departments.

Childhood Lead Poisoning

Childhood lead poisoning is one of the most common environmental pediatric health problems in the United States today, and is entirely preventable according to *Preventing Lead Poisoning in Young Children*, published by the Centers for Disease Control and Prevention in October 1991. Scientific evidence has shown that adverse health effects in children occur at blood lead levels of 10 µg/dL. Virtually all children in the United States are at risk for lead poisoning; no socioeconomic group, geographic area or racial or ethnic population is spared. Missouri's large lead mining and smelting industry places its citizens at even higher risk for lead poisoning.

Although there are many sources of lead found in the environment, lead-based paint is the most common source of lead exposure for children. In 1978, paint with high concentrations of lead was banned for household use, but houses built before 1980 often still contain lead-based paint. As this paint flakes, chalks or is disturbed during renovation, paint chips and dust are created. The normal hand-to-mouth activity of young children places them particularly at risk for being adversely affected by this exposure.

In 1994, 35,929 blood lead tests were conducted for children less than 6 years of age. Of these tests, 8,179 (22.8%) showed blood lead levels ≥10 µg/

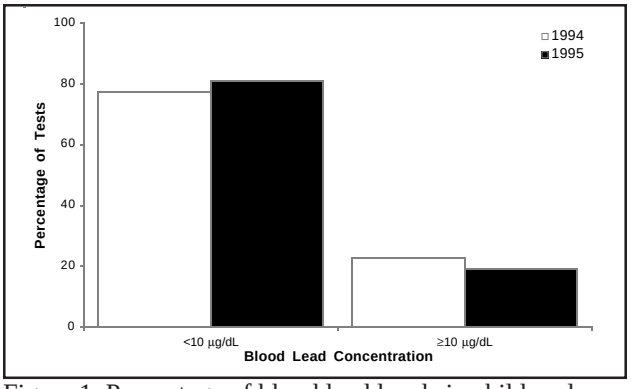


Figure 1. Percentage of blood lead levels in children less than 6 years of age, Missouri, 1994 and 1995

dL. In 1995, 46,348 blood lead tests were conducted for the same age group, with 8,781 (19.0%) showing blood lead levels ≥10 µg/dL. See Figure 1.

Figure 2 shows the counties in Missouri where enough children, less than 6 years of age, have been screened to accurately predict elevated blood lead levels of concern.

Among children 6–17 years of age, results for 412 and 1,067 blood lead tests were received in 1994 and 1995, respectively. These results showed that 13.6 percent (in 1994) and 11.2 percent (in 1995) had blood lead levels ≥10µg/dL. See Figure 3.

Adult Lead Poisoning

In adults, lead poisoning can cause digestive problems and disorders of the liver, kidneys and other organs. It can also cause anemia and damage to the central nervous system, and can affect the reproductive system of both men and women. It may also cause increased blood pressure in middle-aged men. Acute lead poisoning can cause brain damage, anemia, paralysis, respiratory failure and death.

In 1994, the department received results on 10,578 blood lead tests on adults (18 years of age or older). Of these, 28.2 percent showed blood lead levels of 25–39 µg/dL, 4.3 percent showed levels of 40–49 µg/dL and 1.0 percent showed levels of ≥50 µg/dL. In 1995, 12,594 test results were received. Twenty-five percent showed blood lead levels of 25–39 µg/dL, 4.0 percent showed levels of 40–49 µg/dL and 0.90 percent showed levels of ≥50 µg/dL. See Figure 4. While health effects such as lowered IQ, attention deficit and hyper-activity may be difficult to detect at the lower blood-lead levels of health concern (10–15 µg/dL), as blood -lead levels increase, the physiological effects on the human systems become more serious. The physical effects noted in the previous paragraph become increasingly serious with each higher blood-lead level, and of course, may be additive.

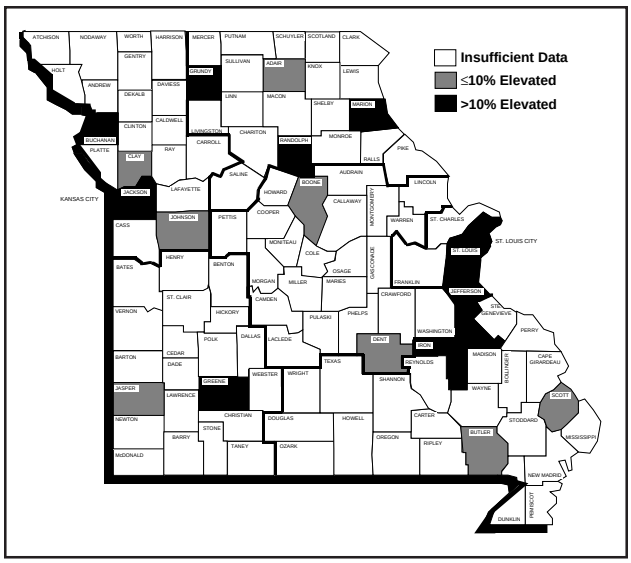


Figure 2. Percent of tests showing elevated blood lead levels in children less than 6 years of age by county, Missouri, 1995

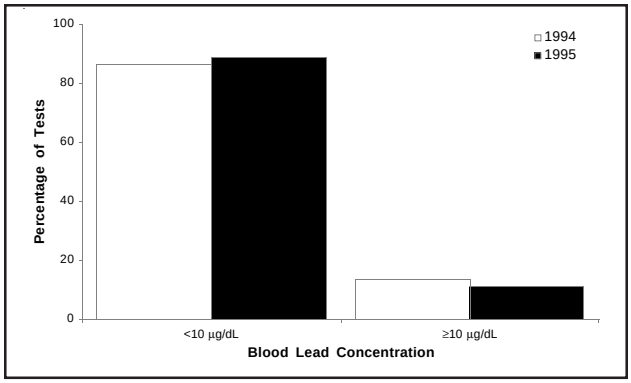


Figure 3. Percentage of blood lead levels in children 6–17 years of age, Missouri, 1994 and 1995

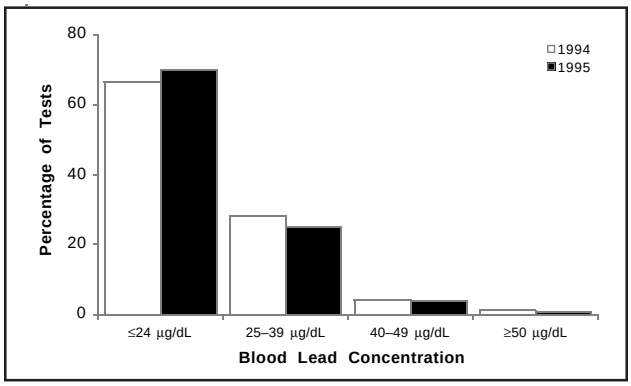


Figure 4. Percentage of blood lead levels in adults 18 years of age or older, Missouri, 1994 and 1995

Workplace Fatalities

According to the Department of Health's latest data, approximately 12 workers die each month and 150 workers die each year on the job in Missouri. Missouri's overall civilian workplace fatality rate averages about 5.7 per 100,000 workers. Though Missouri's overall workplace fatality rate is slightly lower than the national average, the rate in many of our industries is higher. These include agriculture/forestry/fishing, construction and transportation/communication/public utilities. The leading causes of these workplace fatalities are motor vehicle accidents, homicide, contact with objects and machinery, falls and electrocutions.

The workplace fatality rate for the agriculture/forestry/fishing industry in Missouri is 30 per 100,000 workers. Agriculture-related deaths occur mostly in older male workers, with most victims being 55 years of age or older. Tractors remain a leading contributor in these deaths, with almost half being due to tractor rollover. Being struck by the tractor after falling off, or attempting to start the tractor from the ground with the tractor in gear is the second leading cause.

The workplace fatality rate for the construction industry in Missouri is 20 per 100,000 workers. Almost all fatalities are males, with falls being the leading cause of death, followed by contact with objects or equipment.

The workplace fatality rate for the transportation/communication/public utilities industry in Missouri is 14 per 100,000 workers. More than half of these fatalities occur in truck drivers.

Retail trade is Missouri's fourth leading industry for workplace fatalities, with homicide accounting for about 60 percent of those fatalities. Females account for one-third of the total homicide cases, but almost half of all retail-related homicides.

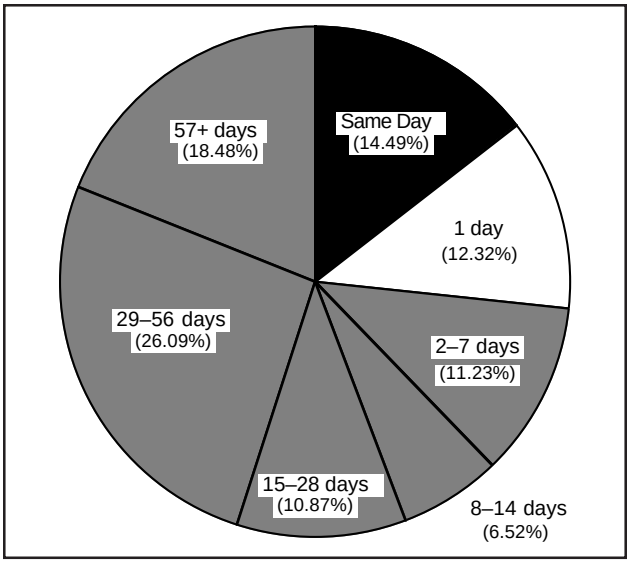


Figure 1. Notification time delays for reporting workplace fatalities, MO FACE Program, FFY 1994 and 1995.

Three out of four of these homicides are committed with a firearm, and gas stations are the most frequent target.

According to the National Institute for Occupational Safety and Health (NIOSH), during the period of 1980–89, approximately 106 workers died each year in Missouri as a result of workplace injury. The Missouri Occupational Fatality Assessment and Control Evaluation (MO FACE) Program identified 133 and 143 workplace fatalities in Missouri in 1994 and 1995 respectively. This increased number does not necessarily reflect an actual increase, but may be attributed to the establishment of the MO FACE Program and an active occupational fatality surveillance system. This surveillance system is designed to monitor, track and investigate all workplace fatalities in Missouri. Through this system, coroners, medical examiners and emergency responders are now more aware of what constitutes a workplace fatality. It also provides them with an outlet to report fatalities and receive feedback on how and where the information is used. Figure 1 shows the time delay in receiving reports of workplace fatalities through the MO FACE active occupational fatality surveillance system. Figures 2 and 3 show notifica-

tion time delays and the number of workplace fatalities reported by reporting source. Increased reporting by on-the-scene sources, such as coroners, medical examiners and first responders, could greatly reduce the delay in receiving notification of workplace fatalities, thus improving our response with investigation and prevention strategies.

The MO FACE Program was established in October 1991 with a five-year federal grant from NIOSH. The program conducts in-depth epidemiological investigations of work-related fatalities and works closely with employers involved in workplace fatalities to help them take steps to prevent similar incidents from happening again. The program is also developing intervention initiatives, such as workshops and seminars, to help employers recognize workplace hazards and prevent fatalities before they occur.

During the reporting period of October 1, 1993 through September 30, 1994, the MO FACE Program received 234 reports of possible workplace fatalities. Of these, 144 were determined to be workplace fatalities. The remaining 90 fatalities were determined to be due to natural causes or were not work-related. On-site investigations were conducted on 22 of the workplace fatalities: 14 falls from elevations, seven electrocutions, one confined-space entry incident and one refuse collection related death.

During the reporting period of October 1, 1994 through September 30, 1995, the MO FACE Program received reports of 323 possible workplace fatalities. Of these, 133 were determined to be workplace fatalities. On-site investigations were conducted on 19 of the workplace fatalities: nine machine-related, seven falls from elevations, one related to refuse collection, one electrocution and one confined-space entry.

Though there are many causes for workplace fatalities, three causes were identified as contributing to about 75 percent of the total

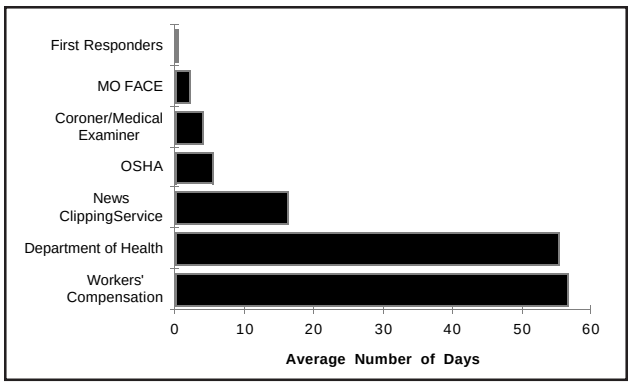


Figure 2. Notification time delays for reporting workplace fatalities by reporting source, MO FACE Program, FFY 1994 and 1995.

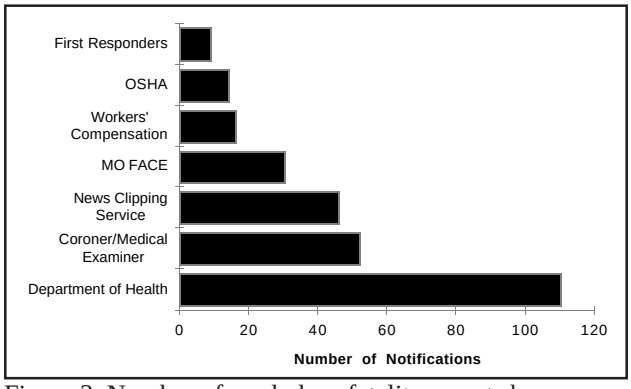


Figure 3. Number of workplace fatality reports by reporting source, MO FACE Program, FFY 1994 and 1995.

workplace fatalities reported in Missouri since 1992. Transportation-related events were the highest, accounting for about 40 percent of all fatalities reported. The agriculture/forestry/fishing industry accounted for 26 percent of these, and the transportation industry accounted for 23 percent. Contact with objects and equipment and assaults and violent acts each accounted for 17 percent of all reported workplace fatalities.

In summary, we see agriculture as the highest-risk industry in Missouri, and it continues to account for the largest portion of workplace fatalities. Tractors, by far, are the leading cause of these deaths. Overall, the most frequent cause of workplace fatalities is motor vehicle incidents.

Other Environmental and Occupational Diseases and Conditions

Disease	1994	1995
Acute Chemical Poisoning	1	3
Asbestosis	1	0
Farmer's Lung	0	1
Pesticide Poisoning	2	3

There were no reported cases of byssinosis, methemoglobinemia, silicosis or toxic organic dust syndrome during these two years.